A+

The #1 Apple II Magazine

SEPTEMBER 1987
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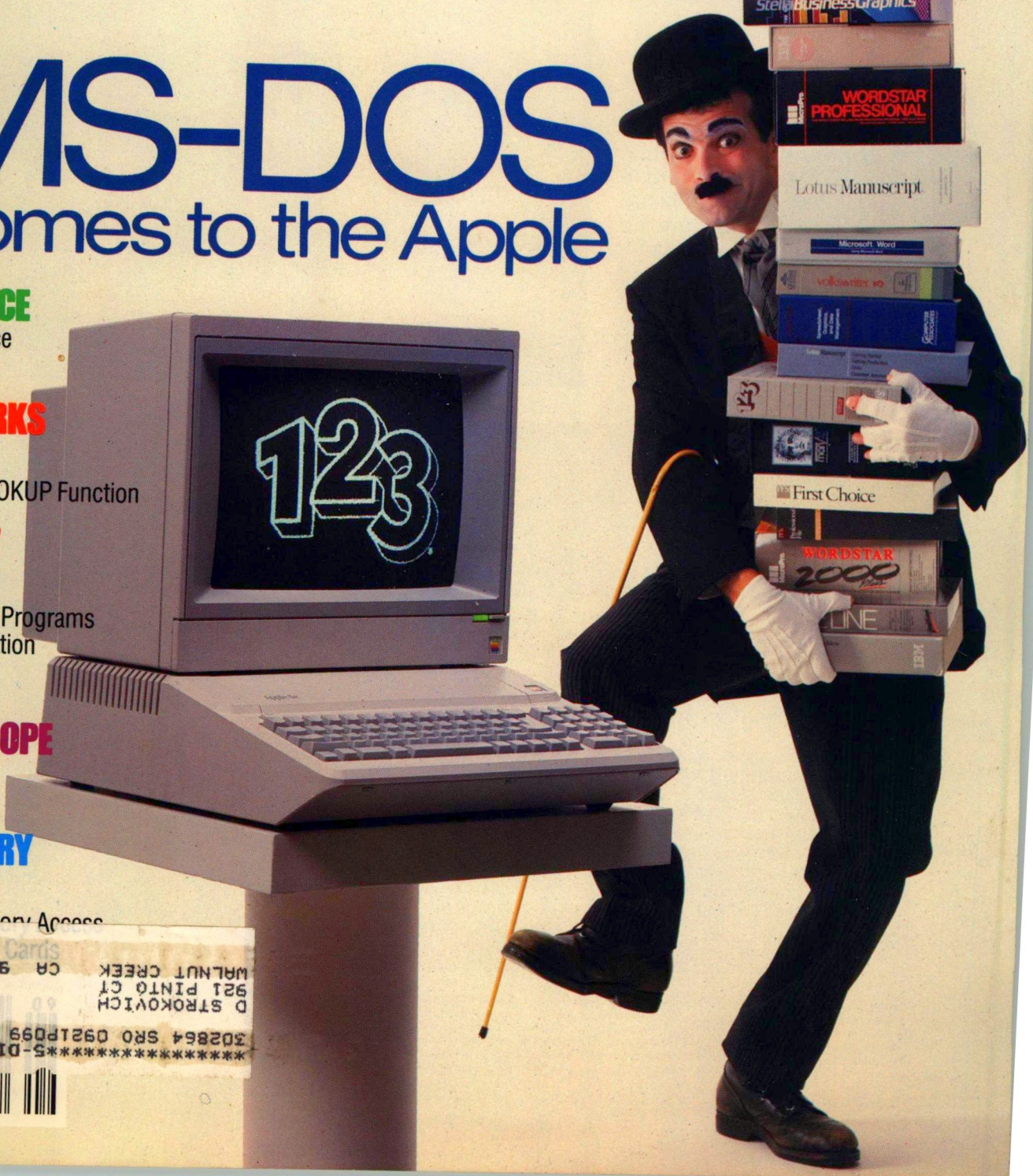
Comes to the Apple



ON BALANCE
Personal Finance Made Easy

APPLEWORKS REPORT
Using the @LOOKUP Function

TEACHERS' TOOLBOX
Eight Top-Rated Programs for Health Education

IIGS OSCILLOSCOPE
Includes Free Program Listing

IIGS MEMORY UPDATE
How Direct Memory Access Affects IIGS RAM Cards

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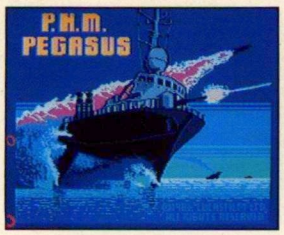

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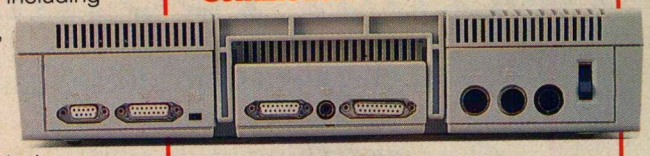

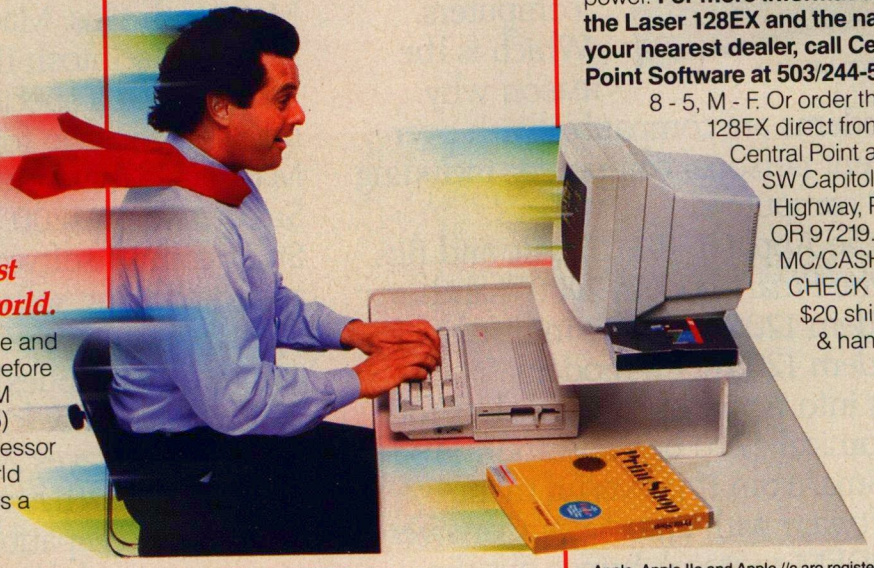

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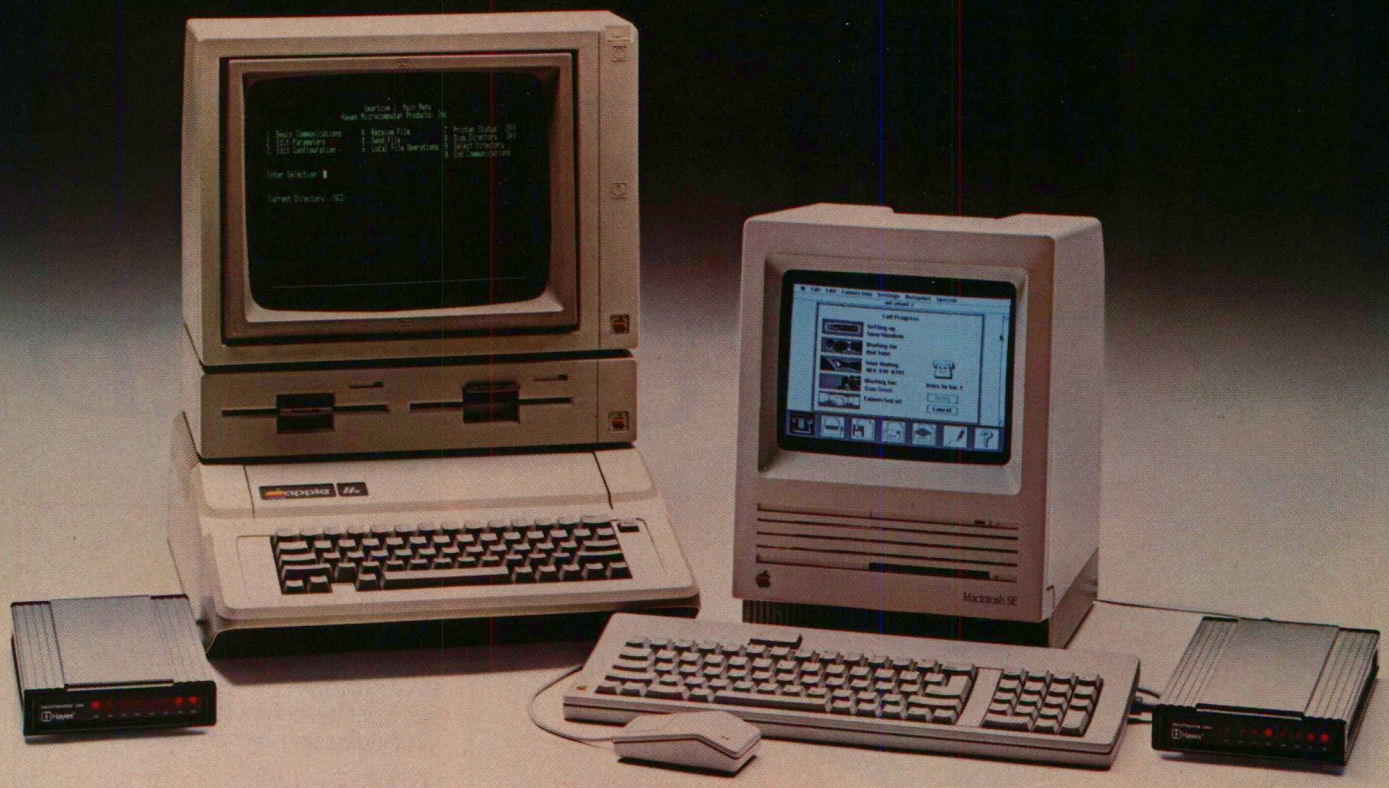

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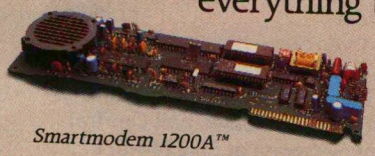

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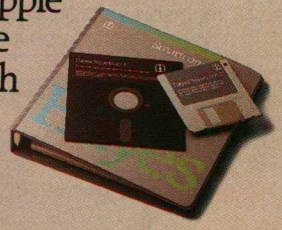

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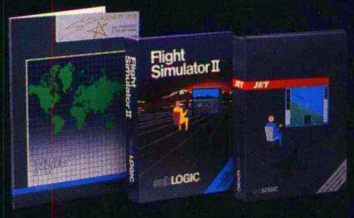

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ADVERTISING/BUSINESS OFFICE	ZIFF-DAVIS PUBLISHING CO.
A DIVISION OF ZIFF	ONE PARK AVENUE
COMMUNICATIONS CO.	NEW YORK, NY 10016
	(212) 503-5209
SUBSCRIPTION INQUIRIES	A+, P.O. BOX 2965
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A+ The #1 Apple II Magazine ISSN (#0740-1590) is published monthly for $24.97 one year, $43.97 two years, and $57.97 three years. Additional postage $5 for Canada, $5 other foreign by Ziff-Davis Publishing Co., a division of Ziff Communications Company, One Park Ave., New York, NY 10016. Second-Class Postage paid at New York, NY 10016 and at additional mailing offices. **POSTMASTER:** Send address changes to A+, P.O. Box 56493, Boulder, CO 80321-6493.

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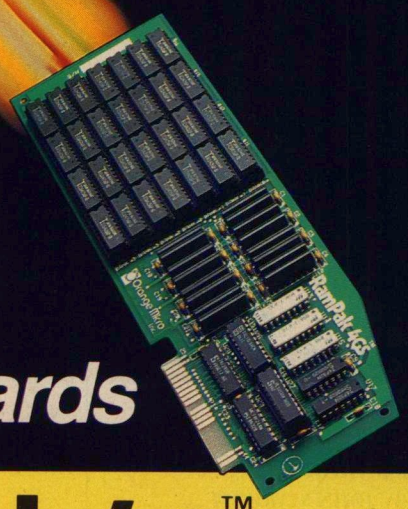

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COVER STORIES

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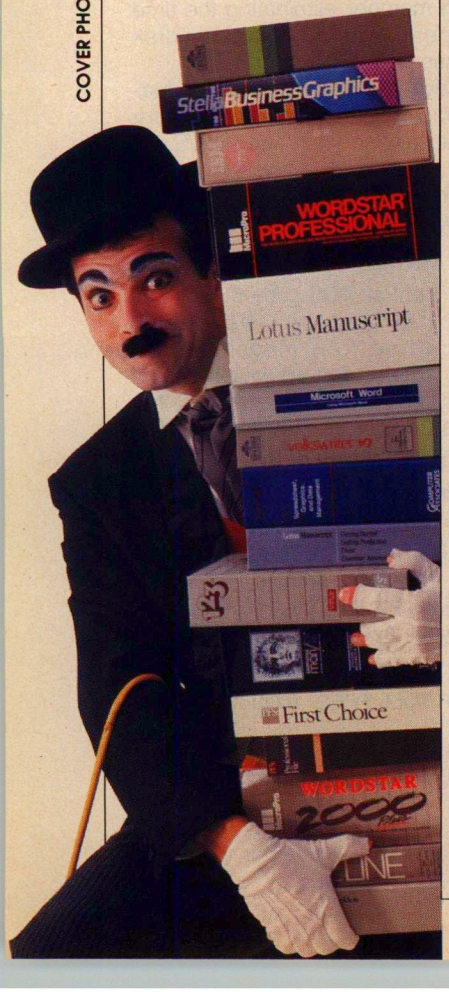
PC TRANSPORTER
BY JOHN MARKOFF
PC Transporter does the seemingly impossible—it lets the Apple II Plus, IIe, and IIGS run IBM software. Here's our preview of this technological achievement.



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A guide to the @LOOKUP function in the spreadsheet module, suggestions for using AppleWorks effectively, answers to AppleWorks questions from our readers, and another approach to creating multicolumn text

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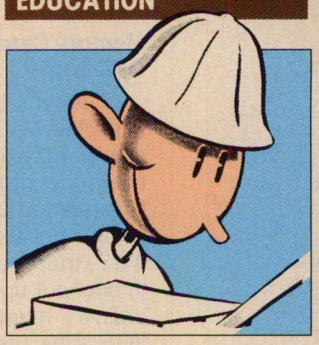

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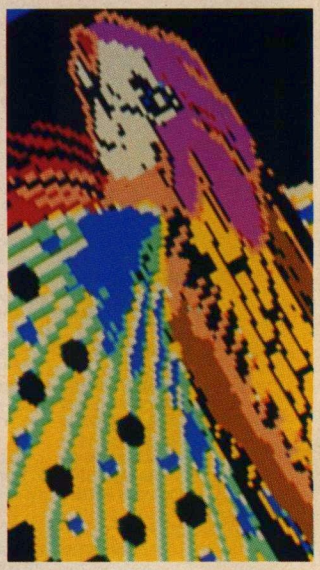

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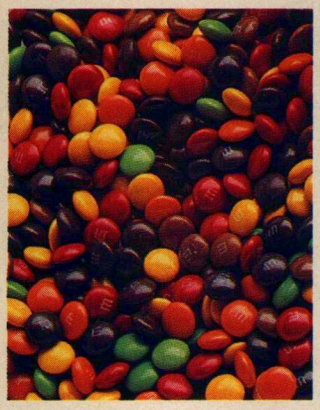

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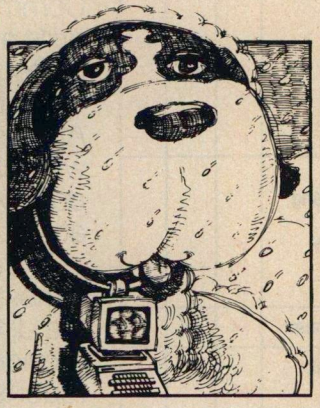

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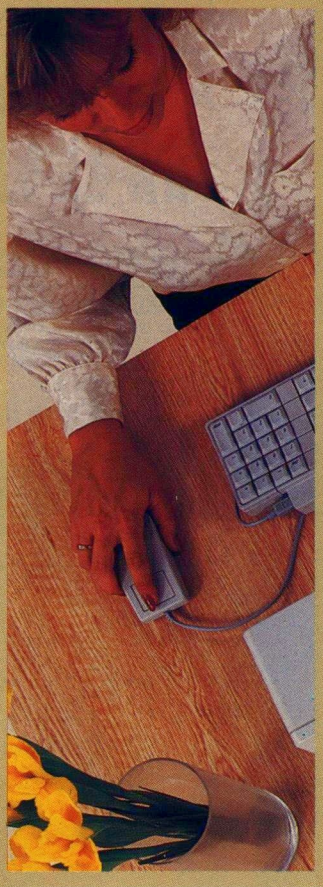
ALL ABOUT APPLE IIGS DESK ACCESSORIES
BY GARY B. LITTLE
The IIGS—like its cousin, the Macintosh—provides a way for developers to write "desk accessories." Here's an introduction to these auxiliary programs, with a look at what's available now and what's likely to be available in the future.



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If you've tried to use certain memory boards with the VisionPlus digitizer on the IIGS, you may have run into some difficulties, but there are ways to work around the problems with this combination.

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BY ROLAND GUSTAFSSON
A type-in program that lets you see sound input displayed oscilloscope-style on the IIGS screen

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each finger	✔		
Error analysis showing distribution of errors among six major categories: wrong column, wrong row,	✔		✔
transposition, dropping,	✔		
mirror image, shifting	✔		
Reports by students' names	✔	✔	
Reports show continuous day-to-day progress	✔		
Reports can be printed	✔		

*No tests in MasterType

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In fact, the features that make Type! the most advanced touch typing software on the market are simply not available on any other program.

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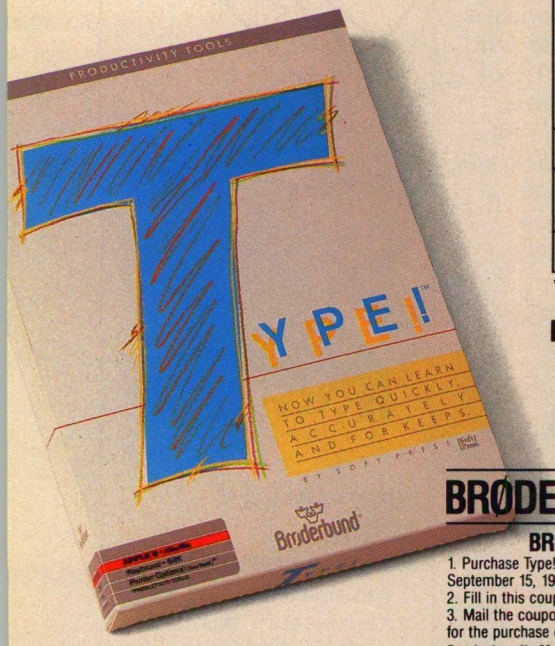

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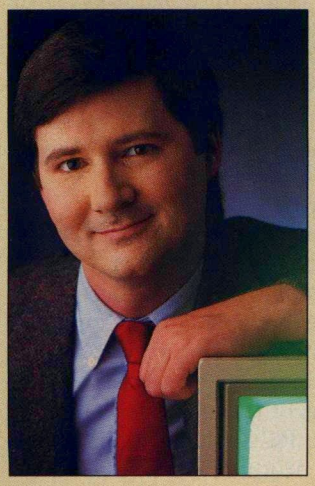

EDITOR'S PAGE

THE BEST OF BOTH WORLDS

The Apple II series is the leading family of computers in schools and among the most popular in homes and small businesses. Because of the Apple II's long-standing popularity, the Apple II offers the largest amount of software for education, entertainment, personal finance, and small businesses, a total of more than 10,000 different software packages.

The IBM PC series, on the other hand, is the leading family of computers in large offices and corporations. Because of the PC series' (and compatibles') enormous popularity in offices and corporations, it offers the largest amount of software for medium-size and large businesses, for a total of about another 10,000 software packages. As evidence of the dominance of these two groups of computers, AppleWorks and Lotus 1-2-3 are the two best-selling computer programs in the world. In fact, AppleWorks became, for a few months last year, the only software package ever to outsell Lotus 1-2-3 on a monthly basis.

Consumers have often been torn between buying one or the other of these systems. The Apple II is strong in education and consumer software but weak in sophisticated business software. The IBM series has plenty of business software but is harder to learn and use, isn't as much fun, and isn't as good a choice for families with children in school. Soon, however, Apple II owners can have the best of both worlds.

Beam Us a Board, Scotty

A new add-in card from Applied Engineering called PC Transporter allows an Apple II Plus, IIe, or IIGS to run MS-DOS programs at about two to three times the speed of a regular IBM PC or PC clone. This technological advance opens up a whole new world of software to Apple computer users. One of the great things about the Apple II Plus, IIe, and IIGS is the open nature of the system, which provides slots for add-in expansion cards.

Just as the CP/M card was popular with Apple II owners (Apple IIs ended up becoming the largest installed base of CP/M-capable computers), the PC Transporter promises to be a big hit. Someone is finally providing a decent upgrade path for the II Plus (shame on Apple that II Plus owners can upgrade to MS-DOS but not to the IIGS).

The PC Transporter opens up a whole new world of software to Apple users.

The PC Transporter product was code-named Little Blue (see "News-Plus" in the January 1987 issue of *A+*). The board's new name makes reference to the legendary "Star Trek" TV series. The PC Transporter board contains a NEC V30 chip that is comparable to a 16-bit 8086 processor and provides a socket for an optional 8087 math coprocessor chip that speeds up number-crunching operations. The board has a special built-in disk-drive controller that can operate 3.5- and 5¼-inch floppy-disk drives so that they can read from and write to MS-DOS diskettes. With the addition of this board, your Apple II will truly become the world's most versatile personal computer; you'll be able to run Apple II software and MS-DOS software, a combination that will supply you with the widest array of software options of any computer owner.

Sneak Preview Looks Good

Applied Engineering provided us with one of the first finished PC Transporter boards, and we've started doing

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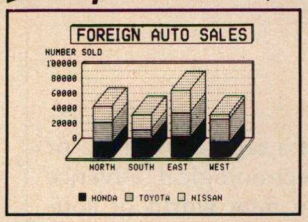
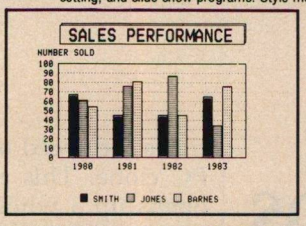
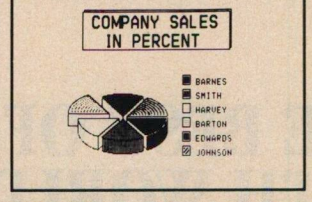
AlphaChart $29.95

Create beautiful vertical bar charts in two or three dimensions, stacked or side -by-side. 2D/3D pie charts with exploded slice and floating label capability. Terrific extras include drawing, type-setting, and slide show programs. Style menu permits an unlimited number of chart variations.

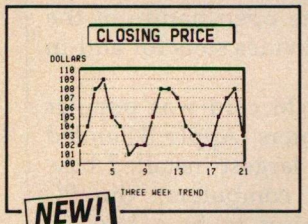


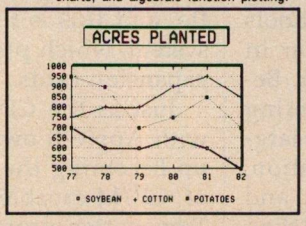


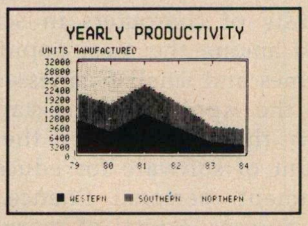


CurvePlotter $29.95

This progam creates standard, connect-the-points, charts, with up to three curves per chart. Also included are area charts (stacked curves with shaded areas), best-fit straight line trend charts, and algebraic function plotting.







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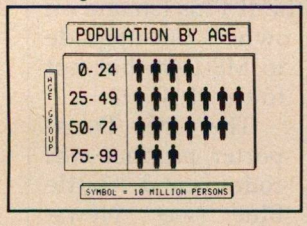

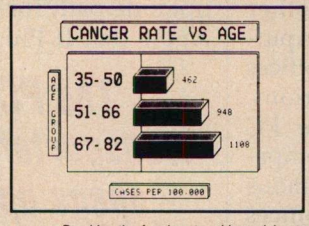

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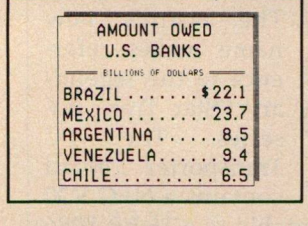

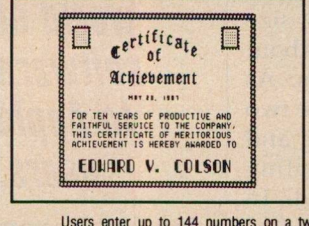

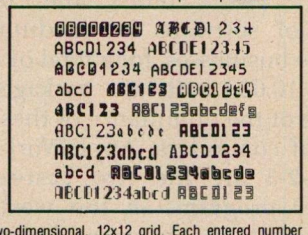

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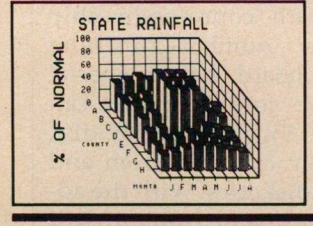

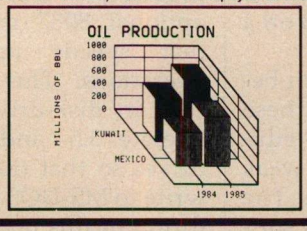

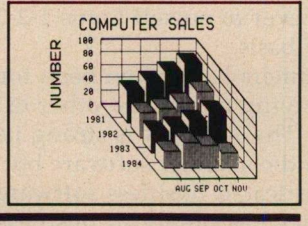

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EDITOR'S PAGE

some benchmark tests of the board in our new testing lab, with the assistance of PC Labs, an independent MS-DOS testing laboratory operated by our sister publication *PC Magazine*. So far, we've found that the PC Transporter board is faster than an ordinary PC and roughly equivalent in processing power to the new IBM Personal System/2 Model 30. Our first tests of the board indicate that it is a very good performer in most areas, but disk access is not as fast as that of the IBM system.

The final software that will come with the PC Transporter is not finished, so we haven't begun our formal testing process yet. Once we have the final product, we'll be doing a comprehensive set of benchmark tests and compatibility checks of the board. Because we think the PC Transporter is an important product, however, we're providing a preview of the board in this issue of *A+*. We usually like to stay away from "vaporware," but we already have our hands on a board that runs MS-DOS programs as promised, and it looks like a very real product. The opportunity to give you a sneak preview of this long-awaited product was too good to pass up.

The PC Transporter board was designed by a talented group of engineers that included five of Apple's principal Apple II engineers, and it contains a lot of advanced technology and complex chips that allow the board to mesh well with the Apple II technology. For example, the board recognizes a ProDOS clock in an Apple II and translates the information into the MS-DOS operating system when you are using MS-DOS. Also, the RAM on the PC Transporter board can be used by Apple II native programs (such as AppleWorks) as well as MS-DOS programs.

Likewise, a hard disk, modems, and printers can be shared by Apple II software and MS-DOS software. The combination of an Apple IIe, or better yet an Apple IIGS, with a PC Transporter board is better than a regular IBM PC, PC clone, or even the new IBM Per-

EDITOR'S PAGE

sonal System/2 Model 30. It's better because you can run the enormous amount of 8-bit Apple II software, the great quantity of MS-DOS business software, and (if you have a IIGS) the growing number of Mac-like IIGS programs. The sharing of peripherals and memory makes it cheaper than buying separate Apple and IBM systems.

Certainly, not every Apple II owner needs MS-DOS. In fact most Apple II owners probably won't need it, since you can do so many things with an Apple II already—most Apple users only scratch the surface of what they can do with their existing system. Also, Apple II software tends to be much easier to use and less expensive than equivalent MS-DOS software. If you do need MS-DOS, however, or if you think you might need it, you don't have to get rid of your Apple II. You can just add MS-DOS to the long list of software options available for your Apple II, the world's most versatile computer.

Welcome Gary and Jennifer!

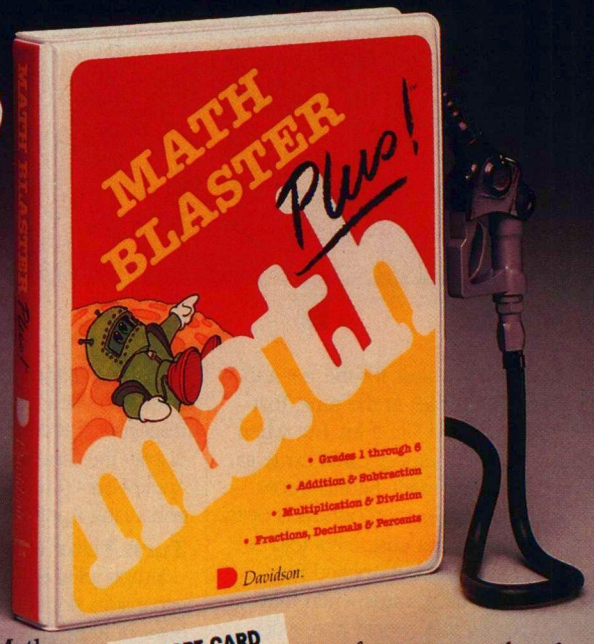
We have two new staff members here at *A+*: Gary Little and Jennifer Brawer. Gary Little, whom many of you know is one of the top Apple II experts and author of several popular computer books, has joined us as Senior Technical Editor. Chip Carman, our former Technical Editor, has taken on the job of Technical Director for the new A+ Labs and MacUser Labs and will be overseeing benchmark, compatibility, and other engineering tests on Apple II products that we will be reporting on in upcoming issues. Jennifer Brawer, who holds two Masters degrees from Stanford University, is a specialist in computers and education and has joined us as Associate Editor. Gary and Jennifer's considerable skills will help us continue to provide the best magazine available for Apple II users. ✚

Fred

FREDERIC E. DAVIS/**EDITOR IN CHIEF**

HIGH GRADE FUEL.

NEW



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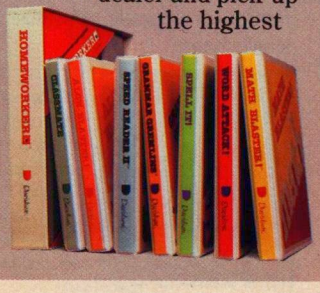

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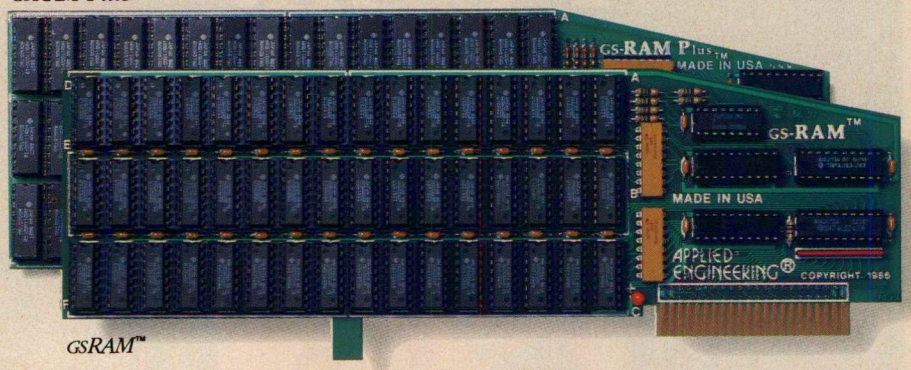

GSRAM™

Remember the 16K cards for the II+ and the 64K cards for the IIe? At the time, that much memory seemed like a lot. But when the owners of these memory cards came to us for more memory, many had to throw away their smaller Apple memory cards or try to sell them. Most of our customers told us that had they known about Applied Engineering's larger memory cards when they bought their Apple, they would have purchased them at the same time.

GSRAM and GSRAM Plus are available now, allowing up to 8 MEG of memory expansion. That's 8 times the memory capacity of Apple's card and just look at the benefits that only GSRAM and GSRAM Plus have over Apple's card:

- Lower cost
- Has 6 RAM banks (Apple's card has 4)
- Has memory expansion port
- Has ROM expansion port
- No configuration blocks to set
- No soldered in RAM chips
- Expandable to 8 MEG
- Expands AppleWorks internal limits
- Built-in Hi-Res self-diagnostic software
- 5 year hassle free warranty (Apple has a 90 day warranty)
- Made in USA

GSRAM for More AppleWorks Power

Only GSRAM and GSRAM Plus eliminate AppleWorks internal memory limits, increasing the maximum number of records available from 6,000 to over 25,000 and only GS-RAM and GSRAM Plus increase the number of lines permitted in the word processing mode from 6,000 to over 15,000. And only GSRAM and GSRAM Plus offer a built-in printer buffer so you can continue using Appleworks while your printer is printing. GS-RAM and GSRAM Plus even expand the number of lines in the clipboard from 255 to 2047 and will auto segment large files so they can be saved on two or more disks. You can even have Pinpoint or Macroworks and your favorite spelling checker in RAM for instant response. GSRAM and GSRAM Plus will even display the time and date right on the AppleWorks screen. Nothing comes close to enhancing AppleWorks so much.

Turn Your IIGS into a Giant

Simply plug GSRAM into the IIGS memory expansion slot and you've got up to *8 megabytes* of RAM at your fingertips—all of it instantly and automatically recognized by the IIGS. GSRAM is compatible with all IIGS software, including AppleWorks, as well as BASIC®, ProDos, DOS 3.3, PASCAL®, "C" and CP/M®.

Grow by Bytes or Megabytes

We offer GSRAM in two configurations so you can increase your memory 256K at a time (GSRAM) or a megabyte at a time (GS-RAM Plus). Both offer full compatibility, lower cost than other boards, and easy expandability. And both are extremely low in power consumption. A fully expanded GSRAM operates at only 375 ma, and GSRAM Plus at only 270 ma (even with 6 megabytes on board!)

GSRAM—for Normal Memory Requirements

GSRAM is available with 256K, 512K, 1 MEG or 1.5 MEG of memory already on board. If you don't need the full 1.5 MEG now, you can choose a GSRAM with less memory and expand it up to 1.5 MEG in the future—or upgrade to GSRAM Plus for a small charge.

"In quality, performance, compatibility, expandability and support, Applied Engineering's GSRAM and GSRAM Plus are number one."

Steve Wozniak, the creator of Apple Computer

With an optional piggyback card, you can expand GSRAM even higher than 1.5 MEG! (Other cards are only expandable to 1 MEG.)

GSRAM Plus—for Growing by Leaps and Bounds

GSRAM Plus is the first Apple memory card to use 1 MEG RAM chips on the main board. It's available with 1 to 6 MEG on board. If you don't need the whole 6 MEG now, you can buy a GSRAM Plus with less memory and easily expand it in the future.

GSRAM Plus can be expanded up to 8 MEG with an optional piggyback card.

Easy Expansion

Both GSRAM and GSRAM Plus use standard RAM chips that are readily available and just plug right in. So unlike other cards, you'll find expanding your GSRAM or GSRAM Plus easy, convenient and very economical. And with our optional ROM expansion module you can even increase the IIGS's ROM space and all in just one slot.

Quality and Support of the Industry Leader

Applied Engineering is the largest supplier of Apple peripherals in the world. We *invented* the first large RAM cards for the Apple. With a 5-year "no-hassle" warranty and outstanding technical support, you can be sure GSRAM and GSRAM Plus will deliver the performance you're looking for—or return them within 15 days for a full refund.

GSRAM with 256K	$169
GSRAM with 512K	$219
GSRAM with 1 MEG	$299
GSRAM with 1.5 MEG	$379
GSRAM with 2-8 MEG	CALL
GSRAM PLUS with 1 MEG	$459
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LETTERS TO THE EDITOR

A NEW TWIST ON RIBBONS

Dear *A+*: In "New Life for Old Ribbons" (June 1987), the author has an interesting and clear description of how to replace a ribbon in a cartridge, including cutting and regluing the new one. He missed mentioning that you should turn one of the ends 180° before gluing it, however, putting a Moebius twist in the ribbon so it will distribute the ink and wear more evenly. The twist is present in all the commercial ribbons. It can be automatically installed if you use an old ribbon to pull the new one into place but has to be put in if you use a typewriter ribbon.

Also, you should cut the ends at an angle, to provide a longer overlap and decrease stress concentration.

HOWARD S. BALSAM
NASHUA, NH

MORE INSTRUMENTS

Dear *A+*: I am a *very* proud owner of a loaded Apple IIGS system. Your article "Super Sounds" (July 1987, pages 60–68) stated that Music Construction Set (MCS) from Electronic Arts had only 9 instruments. This assertion is quite untrue. Music Construction Set has 33 instruments. Your reviewer did not read the MCS manual, or he would have known that pressing the down-arrow key on the keyboard or the down-arrow on the scroll bar scrolls the instruments.

One other omission: The article should have mentioned that you can use the command key (open apple) while selecting a note to be able to place that note many times without having to go back to the parts box.

AARON SALSITZ
ANN ARBOR, MI

FANTASTIC FASTFIND

Dear *A+*: I am compelled to write to you regarding a company that advertises in your magazine; FASTFIND CO. in Palos Verdes, California. It advertises a computerized "Super Index" of all of the articles and letters appearing in your magazine and a search utility that allows fast retrieval of information containing any keywords you specify—all at a price that seems hard to believe.

I ordered the package last year and found it to be the greatest thing since pin-feed paper. Not only does it find any and all references to the chosen word or phrase at lightning speed, but on the flip side of the disk you get a users' manual that you send to your printer that rivals those of the big software houses in clarity and detail.

As if that weren't enough, the users' manual encourages you to find and report spelling errors to the company, for which it will send a free update disk if you are among the first three people to find the error. I have received two such free disks, each accompanied by a letter of thanks for helping the company maintain its high standard.

The program has many other features too numerous to list here, but I encourage everyone who subscribes to your magazine to give FASTFIND a try. What a pleasure to find a product that gives you more than it advertises, at a price that is close to free, supplied by a company that really cares about quality and is willing to prove it!

THOMAS G. GAHL
PEORIA, AZ

DISSATISFIED VIP CUSTOMER

Dear *A+*: I read your May 1987 issue of *A+* with particular interest. Your article on the VIP Professional spreadsheet software hit a sore spot (in my wallet). Amanda Hixson wrote a very comprehensive review. I only wish I could have gotten as far as to test VIP on my system (an Apple IIe with a 1-megabyte RamWorks II board) as she did on hers.

I use Lotus 1-2-3 extensively on my IBM PC at my job as a financial analyst: I have been very eager to purchase software for the Apple II that would have equal macro capabilities. So I purchased VIP—before it was reviewed by your magazine.

As Hixson notes in her article, VIP is *very slow* when it is used in the 8-bit mode on a IIe. Purchasing an Applied Engineering 16-bit option made the program a little bit more tolerable, but my system kept crashing whenever I tried to exit from the program or at times when I tried to print a portion of the spreadsheet. After writ-

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CIRCLE 202 ON READER SERVICE CARD

LETTERS

ing two letters to the Canadian distributor of the program, ISD Marketing, I was informed that VIP would crash when I left the program if a mouse card was not connected to the computer. I was told that a revision was being developed and that I would receive a replacement copy as soon as it was available.

It's been six months since I received that letter from ISD, and I have yet to receive a replacement disk or a response to a subsequent query. So I'm stuck with a program that will not operate properly and a useless 16-bit board. I pity those purchasers who are buying the product and assuming it will work correctly (without the mouse). Nevertheless, I am glad that I own AppleWorks (used with Pinpoint's KeyPlayer) and SuperCalc 3a. They perform!

ANTHONY L. MOORE
GLEN BURNIE, MD

IN DEFENSE OF VIP

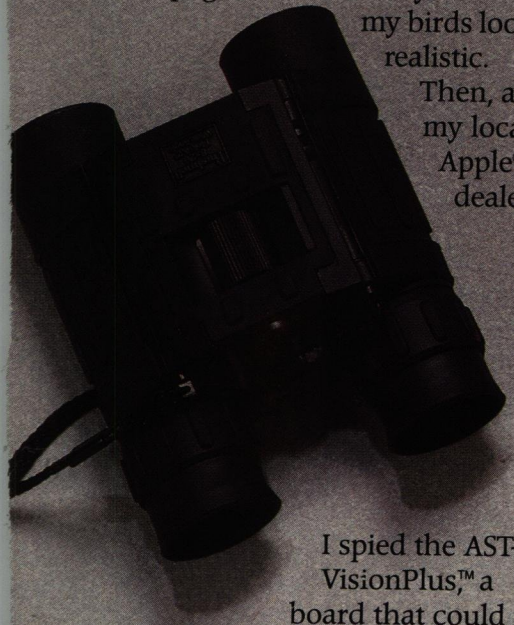
Dear *A+*: Please help me—I'm confused. After reading your review of VIP from ISD Marketing in the May issue of *A+*, it seems I should throw out my Apple IIe and subscribe to a different magazine. I refer to Amanda Hixson's comments "a $700 IBM PC clone and the real 1-2-3 start to look pretty good" and "turn your IIe into a decent PC clone."

I could go on and on about Hixson's comparisons of computers such as her IBM XT and 80286 or 80386 machines to the Apple IIs. It is interesting, however, that her comparison test (again comparing computers) shows how slow the IBM XT is compared to the Mac Plus. Perhaps she should have run the same tests on the Mac II. If I had wanted an IBM or a Mac, I would have purchased one.

Hixson asks the question "Who's it for?" It's for me. Who am I? I'm an owner of an Apple IIe and IIc. I teach an introductory AppleWorks course and Advanced AppleWorks at the local community college. I use my Apples in my business every day of the work week. Yes, I have every enhancement possible for my computer and AppleWorks. Why would I use VIP instead of AppleWorks? For the same reason one would not use 1-2-3 as a word processor. VIP and 1-2-3 have so much more power than a basic spreadsheet program that it doesn't seem proper to refer to either of these programs as basic spreadsheet programs. For someone who wants the abilities of 1-2-3 (not available for the Apple), VIP fills the bill.

After reading about Hixson's 360-payment amortization schedule that required 16 recalculations and 3360 seconds to calculate in AppleWorks, I remembered that one of the things I teach in my Introduction to AppleWorks class is that a good spreadsheet should calculate with one, or possibly two, recalculations. For this reason, I'm not able to figure out how to duplicate her spreadsheet. I did, however, take five minutes to create a 360-payment schedule for my own testing. In short, AppleWorks without Transwarp, 28.85 seconds; with Transwarp, 9.44 seconds. I then used VIP's utilities

"Without realistic images, my newsletter was an endangered species."



The copy was vivid, but the images weren't exactly flying off the page. I needed a way to make my birds look realistic.

Then, at my local Apple® dealer, I spied the AST-VisionPlus,™ a board that could transfer live black and white or color images from a video camera or VCR onto my IIGS™ screen. I bought it immediately.

When I got back home, I plugged the board into my IIGS and connected my video camera to the AST-VisionPlus. Then came the moment of truth.

I posed the camera in full view of my birdfeeder, patiently hoping against hope for the return of the blue-capped flycatching warbler. He did, by jove. And with a quick click of the mouse, I had it on camera. On computer. And on the front page of my newsletter.

Another idea burst into my head. I popped my video cassette "Mating Habits of the Paradise Whidah" into the VCR and spent the better part of the night in a rapturous flurry, capturing images for Christmas cards, T-shirts, flyers, personal stationery and invitations.

Now, everyone flocks around my ImageWriter® to witness my latest AST-VisionPlus output.

And in the midst of so much stretching, scrunching, recoloring and rearranging the composition of my AST-VisionPlus images, I discovered my own set of wings. In my mind, I was free as a, well, you know.

My Asiatic water parrot looked more like a common ostrich. I wanted to bury my head in the sand.

Let your visions soar with the AST-VisionPlus. To find the nearest AST-authorized Apple dealer, call us at **714-553-0340.** BBS: (714) 660-9175. FAX: (714) 660-8063.

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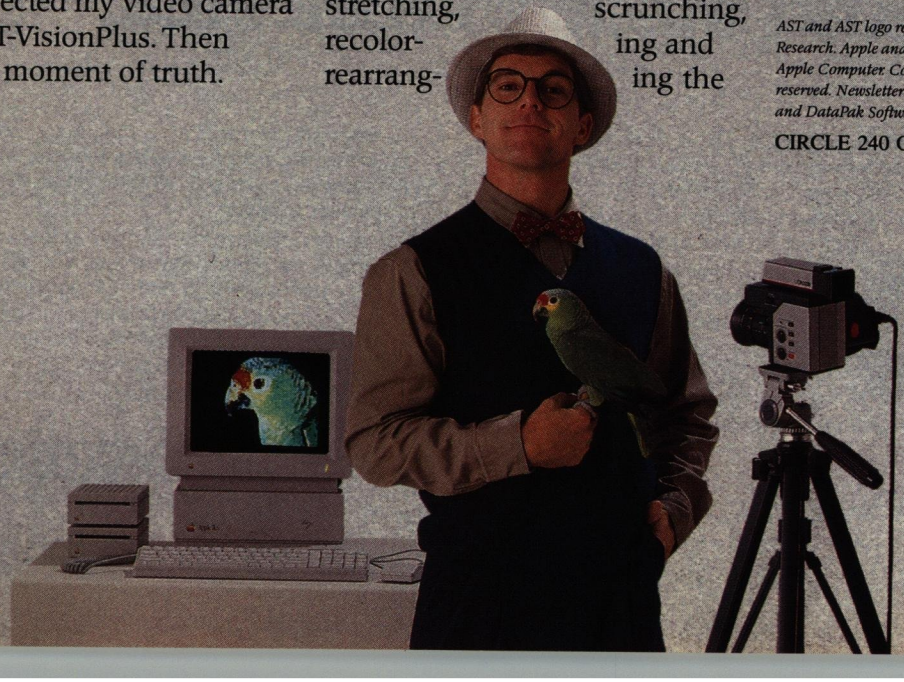
CIRCLE 240 ON READER SERVICE CARD



LETTERS

program (not mentioned in the review) to convert the same worksheet to a VIP worksheet. VIP without Transwarp: 29.51 seconds; with Transwarp: 18.51 seconds.

Obviously, there is a difference between Hixson's and my method of writing a worksheet.

What about the true cost of using VIP? As I mentioned before, I already have the enhancements required to run the program. I know I'm not the only Apple user to use or read about the enhancements so aptly advertised or covered in the many articles in *A+* and other magazines. When Hixson refers to "... additional 512K of memory for another couple hundred dollars," I wonder about the research that has gone into this review. I feel magazines such as yours have a responsibility to review a product on its own merits.

It is likely the first release of a program will have problems. When I did find a problem, I placed a phone call to ISD Marketing and received a quick, helpful response. I have also received several updates of the program free of charge.

No, corporate America, don't throw out your IBMs or clones; yes, Apple users, do consider the additional features now available for the Apple: name-range features; block moves; block copy; macros; numerous financial, logical, mathematical, statistical, database, and date functions. Did Hixson forget to mention these?

A program with the many features of VIP does require a lot of learning, but I don't see why one would refer to the commands of the program as "... VIP's clumsy key combinations and substitute function keys in order to navigate the worksheet and perform common 1-2-3 tasks." If an Apple isn't an IBM and doesn't have the IBM keyboard, is VIP to blame?

SONNY CROPLEY
SITKA, AK

FISCHER AMERICA COMMENTS

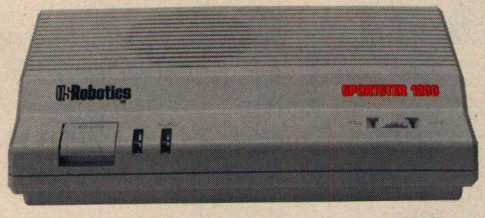
Dear *A+*: I just received my July issue of *A+*, and I was greatly dismayed by your cover-story article, "Discovering Science." I feel that this article has done some serious harm to the perception of our product by your readers.

The problems deal with a major inaccuracy in the article and the wrong Fischertechnik product being compared in relation to the other products evaluated.

First, our three-axis arm that you evaluated sells for $498, not $155 as you stated. Second, we have two other kits that fit more closely with the grade levels and sophistication of the other products reviewed in the article. One of these Fischer kits is just being released, and one presently on the market has just had extensive learning materials developed for use with it.

The three-axis arm that you evaluated is primarily intended for a very sophisticated market at the university level, not the K–12 market that seems to be the target audience of the article.

JIM BUSSEY
NATIONAL SALES MANAGER
FISCHER AMERICA
MODESTO, CA



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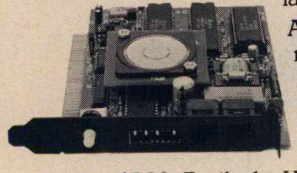

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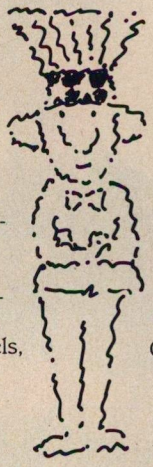

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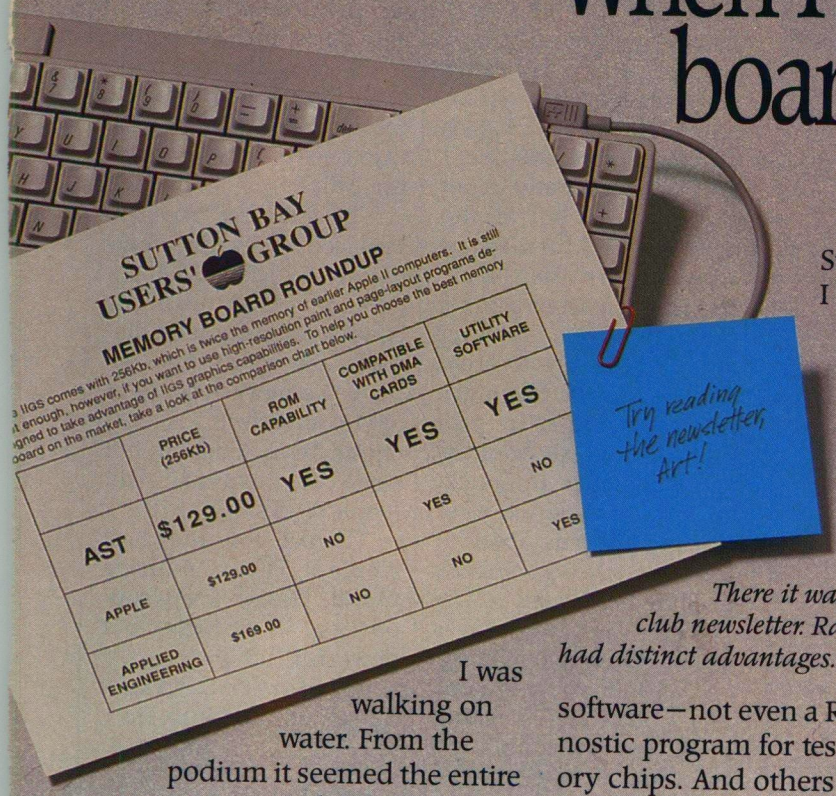
CIRCLE 214 ON READER SERVICE CARD

"Everyone gasped when I said all memory boards were alike."



There it was in the club newsletter. RamStakPlus had distinct advantages.

I was walking on water. From the podium it seemed the entire user group was hanging on to my every word. And then out of nowhere, this guy from the back row asks, "Which memory card would you recommend for my IIGS™?"

The rest is history. And it looks like I am too. Who would have thought the differences in memory boards made a difference?

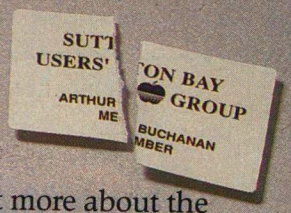
CIRCLE 245 ON READER SERVICE CARD

Sure enough, I learned that some memory cards are price competitive, but include no software—not even a RAM diagnostic program for testing memory chips. And others are too expensive to even consider.

For the best combination of features at a really unbeatable price, the choice is clearly RamStakPlus.™ It's the only memory card that contains ROM sockets for EEPROMs or EPROMs. Which means you can store your favorite program in ROM memory and it won't disappear when you turn the power off. Plus, the RAM space you conserve can be used to create bigger spreadsheets, database files or reports.

Well, you live and learn. And if you're lucky, you get even. I'm brushing up on my facts for tonight's meeting. You'll never guess who's speaking. The guy from the back row.

Overlooking the basics could have been a costly mistake.



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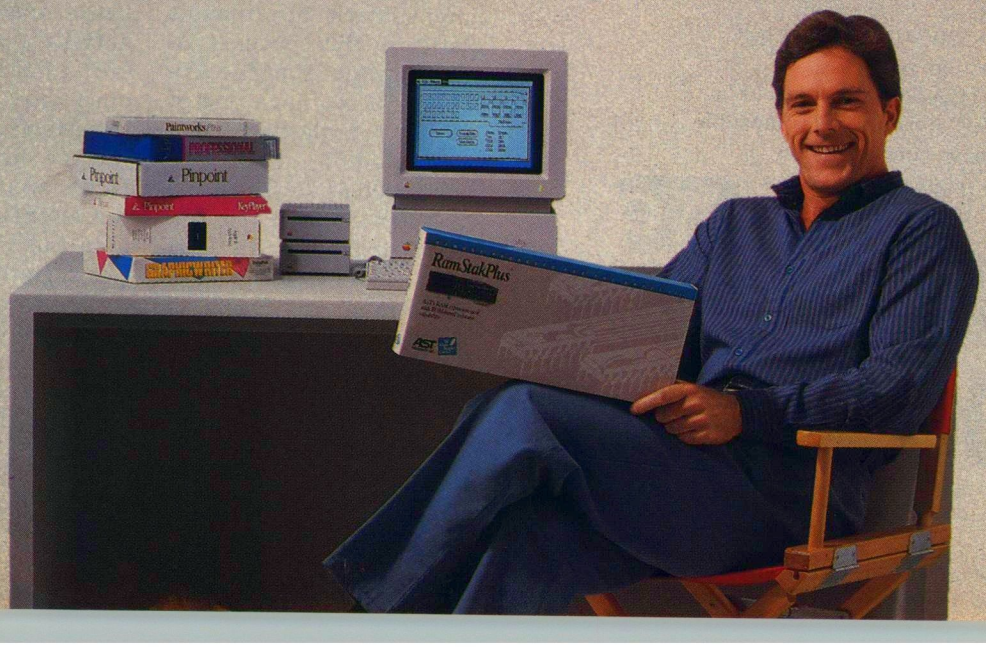

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CIRCLE 244 ON READER SERVICE CARD

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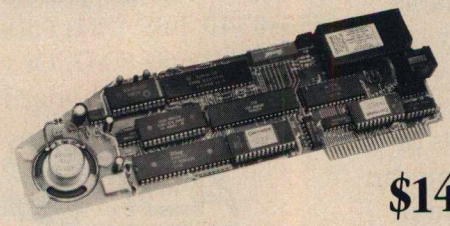

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LETTERS

TIME IS MONEY

Dear A+: Recently, you had an article praising the virtues of a program called Quicken. When Quicken first came out, I called the company to get a copy of it, but at the time I was told it was not available for the Apple IIe. Then I started using a program from Turning Point Software called Time Is Money. I thought it was a fantastic program. About six months ago, I switched to Quicken for a trial period after reading the ads about it but have since gone back to Time Is Money.

Time is Money is much faster than Quicken. With it, you can keep many separate checking or savings accounts on the same disk. Also, the ease and speed of entering the information are phenomenal—much faster, to my way of thinking, than Quicken.

JOHN C. HOLZ
SUN CITY, AZ

ANOTHER IIc FAN WEIGHS IN

Dear A+: As you can see, I am one of your readers "over the pond." I read with interest and agreement Mark Strothman's letter in the February issue, in support of the Apple IIc. I too have one of these fantastic machines—not as well equipped as Mark's. Mine has just an external 5¼-inch drive and an ImageWriter. I too make wide-ranging use of AppleWorks, enhanced in my case with AutoWorks.

I have considerable experience using the usual business PC, with some well-known software, all of which is powerful but could learn much from the AppleWorks user interface. When I compare the contortions necessary to format printer output on the integrated package I use professionally, with the IIc interface with Lissner's program, I feel sometimes like taking the Apple with me to the office.

The IIGS has recently replaced the IIc completely in the UK. It's a great pity that the IIc is considered obsolete. Besides the new IIGS, we have the newest range of IBM-compatible machines from Amstrad, but none of them can run AppleWorks!

Thanks for the best Apple II magazine I have found. Please keep supporting the little but powerful IIc!

HARVEY L. NYMAN
HARROW, MIDDLESEX, ENGLAND

UNDOING A POSTAL INJUSTICE

Dear A+: This letter is to ask for your help in undoing an injustice done to me by the archenemy of correspondents everywhere (the U.S. Post Office).

In the last three issues of *A+*, I ran an ad concerning FASTHOUSE, fast software for the Powerhouse X10 interface. Unfortunately, the Pflugerville post office "forgot" I had rented a post-office box and returned all orders for the software for the first two of the three months! To me this carelessness is unbelievable, but you've probably heard similar stories.

Anyway, I would like your readers to know that KADO Systems is alive and well at P.O. Box 1115, Pflugerville, TX 78660.

KEN ARNOLD
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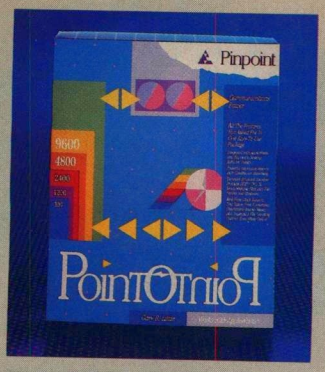

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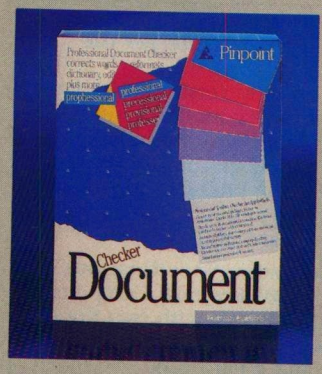

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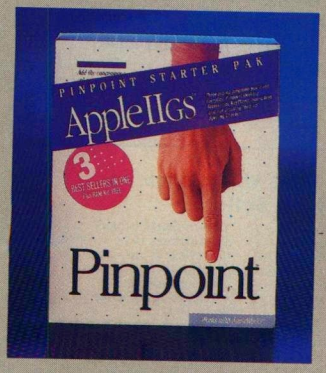

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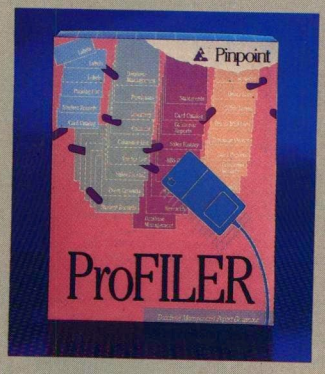

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But don't take our word for it. Software Digest, a leading consumer organization, rated Back to Basics number one in overall usability when compared to products costing as much as $995 and, for the past two years, Back to Basics has won the *A+ Magazine* ***Software of the Year Award*** for business accounting systems thanks to the votes of over 20,000 Apple users.

No Experience Required

Back to Basics assumes you're an expert in only one business—your own.

- Installation of Back to Basics is painless — read only seven pages in the manual and *spend 30 minutes* using our screen menus.
- If you need to brush up on your accounting, use our accounting primer and tutorial, written by Harvard Business School Professor, Robert N. Anthony, plus our business section on how to handle everyday accounting dilemmas.

$199

Back to Basics Accounting System is not only a best seller but an incredible value with all three modules — General Ledger, Accounts Receivable and Accounts Payable — in a complete set for just $199.

In its special report on the best small business accounting software, *PC World* said, "Back to Basics takes the *smallest bite out of your capital,* yet it's also the easiest to use of the three contenders. For a bargain price, Back to Basics provides a lot of punch, especially for businesses with heavy cash handling requirements."

Proven Power

Peachtree has long been the first name in accounting software and the powerful features we've included in Back to Basics prove we understand what you're looking for.

- Complete integration of General Ledger with Accounts Receivable and Accounts Payable.
- Single transaction entries up to $999,999.99 and year-to-date totals up to $21,000,000.
- Journals and reports updated as each transaction is recorded.
- Void transaction facility automatically creates reversing entry.
- *More than 30 reports* can be viewed on screen or printed.

Ongoing Accolades

Back to Basics Accounting System is designed to take full advantage of the capabilities of your Apple II computer, with customized versions for the Apple II+, IIe, IIc, IIgs and Macintosh.

Peachtree's support, labeled by *InfoWorld* as "the finest in the industry", is available as you need it, at a nominal charge directly from Peachtree or through our network of local authorized support centers.

Money Back Guarantee

When you purchase Back to Basics directly from Peachtree Software you're protected with a 30-day, money back guarantee (an option even the most expensive accounting products don't offer).

If you're not satisfied, simply return the complete product in saleable condition within 30 days and your purchase price will be promptly refunded. For full details, call the toll free telephone number below.

Now Available for the Apple IIgs

A new version of Back to Basics Accounting is now available for the Apple IIgs, designed specifically for use with the PRO-DOS operating system and 3½" disk drives or a hard disk.

Hardware Specifications

- IBM Personal Computer, PC/XT, PC/AT with two floppy disk drives or one floppy disk drive and a hard disk.
- Apple II+, IIe, IIc, IIgs with 128K and two disk drives or hard disk.
- Apple Macintosh 512K or Plus with two disk drives or hard disk.

Features That Made Back to Basics A Best Seller

GENERAL LEDGER
- On-line help displays Chart of Accounts.
- MTD and YTD show on income statements.
- Allows automatic Journal entries.
- Check processing and printing capability through Cash Disbursements
- Optional cost of sales ranges.
- User modifiable Chart of Accounts included.
- Allows up to 3 checking accounts.
- Up to 10 departments with separate income statements.

ACCOUNTS RECEIVABLE
- Calculates receivables on balance forward basis.
- Prints statements and mailing labels.
- Allows automatic posting to General Ledger.
- Accepts partial payments.
- Calculates finance charges.
- Up-to-date customer information can be scrolled for review at any time.
- Customer ID's can be alpha or numeric.
- Verifies customer credit limit.
- Calculates up to 3 sales taxes per entry.

ACCOUNTS PAYABLE
- Up to 10 vendor payment terms.
- Calculates cash discounts.
- Accepts partial payments.
- Automatic posting to General Ledger.
- Prints vendor mailing labels.
- Up-to-date vendor information can be scrolled for review at any time.
- Customer ID's can be alpha or numeric.
- Prints computer checks or processes hand-written checks.
- Invoices automatically or manually selected for payment.

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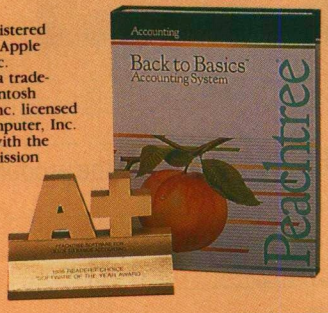

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LETTERS

SERIOUS IIGS USERS UNITE!

Dear *A+*: First, I would like to commend you on your fine magazine. Your "Editor's Page" is the first thing I read when I pick it up each month.

It is with that in mind that I would like to thank you for your continued support of the Apple II line and, in particular, the newest family member, the IIGS. Your March and May '87 editorials were of special interest to me and, I'm sure, to the growing numbers of GS users who are eagerly awaiting some new software to complement our new machines.

Although I am happy that most of the existing software will run on the GS, the idea that Macintosh software will someday be available to us is especially appealing. My only qualm is with the use of the word *someday*.

Sure, I know that software developers are busy coming up with new ideas for software and that many plans for exciting programs are in the works, but how long will we have to wait? You have the opinion that because of the similarities between the Macintosh and GS's Toolbox ROM, design principles, system software, user interface, development tools, and peripheral devices, Mac software will indeed start showing up for the IIGS. In my opinion, it is up to us to let the developers know that we are out here waiting for it. Forget what Apple says about the GS being a "game player's educational computer" just because it's a member of the Apple II family. I can't speak for other GS users, but I can assure you that I am neither. Apple shouldn't dictate how buyers will utilize its machine. Up until the introduction of the GS, Apple got by with that approach, but hopefully that attitude will now change.

If I may, I would like to appeal to the IIGS users to write in and let everyone know that we are serious computer users with a definite need for serious software.

LOU SMITH
SHALLOTTE, NC

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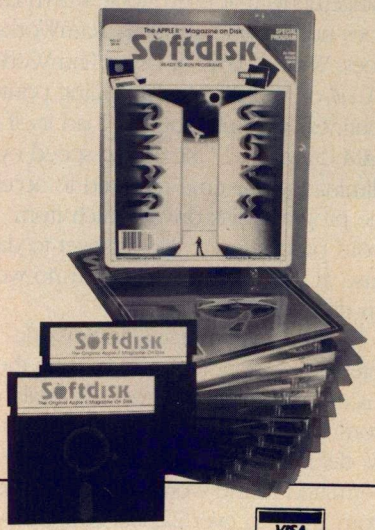

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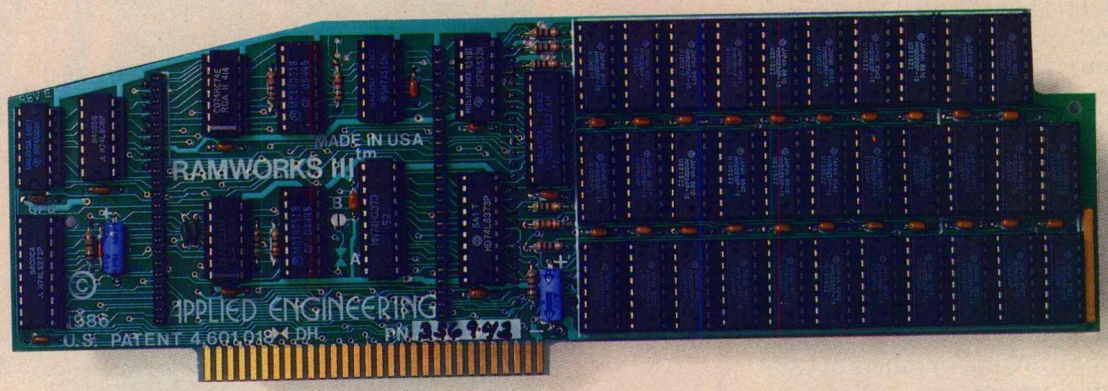

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While RamWorks III is recognized by all memory intensive programs, NO other expansion card comes close to offering the multitude of enhancements to AppleWorks that RamWorks III does. Naturally, you'd expect RamWorks III to expand the available desktop, after all Applied Engineering was a year ahead of everyone else *including Apple* in offering more than 55K and we still provide the largest AppleWorks desktops available. But a larger desktop is just part of the story. Look at all the AppleWorks enhancements that even Apple's own card does not provide and *only* RamWorks III does. With a 265K or larger RamWorks III, *all* of AppleWorks (including printer routines) will automatically load itself into RAM dramatically increasing speed by eliminating the time required to access the program disk drive. Switch from word processing to spreadsheet to database at the speed of light with no wear on disk drives.

RamWorks eliminates AppleWorks' internal memory limits, increasing the maximum number of records available from 1,350 to over 22,000. *Only* RamWorks increases the number of lines permitted in the word processing mode from 2,250 to over 22,000. *Only* RamWorks expands the maximum clipboard limit from 250 to 2,042 lines. And *only* RamWorks offers a built-in printer buffer, so you won't have to wait for your printer to stop before returning to AppleWorks. And auto segments large files so they can be saved on two or more disks. You can even have Pinpoint or MacroWorks and your favorite spelling checker in RAM for instant response.

RamWorks, nothing comes close to enhancing AppleWorks so much.

The Most Friendly, Most Compatible Card Available.

Using RamWorks III couldn't be easier because it's compatible with more off-the-shelf software than any other RAM card. Popular programs like AppleWorks, Pinpoint, Catalyst, MouseDesk, Howard-Soft, FlashCalc, Pro-FILER, Managing Your Money, SuperCalc 3a and VIP Professional to name a few (and most hardware add on's like ProFile and Sider hard disks). RamWorks is even compatible with software written for Apple cards. But unlike other cards, RamWorks plugs into the IIe auxiliary slot providing our super sharp 80 column text (U.S. Patent #4601018) in a completely integrated system while leaving expansion slots 1 through 7 available for other peripheral cards.

RamWorks III is compatible with all Apple IIe's, enhanced, unenhanced, American or European versions.

Highest Memory Expansion.

Applied Engineering has always offered the largest memory for the IIe and RamWorks III continues that tradition by expanding to 1 full MEG on the main card using standard RAMs, more than most will ever need (1 MEG is about 500 pages of text)...but if you do ever need more than 1 MEG, RamWorks III has the widest selection of expander cards available. Additional 512K, 1 MEG, or 2 MEG cards just snap directly onto RamWorks III by plugging into the industry's only low profile (no slot 1 interference) fully decoded memory expansion connector.

It Even Corrects Mistakes.

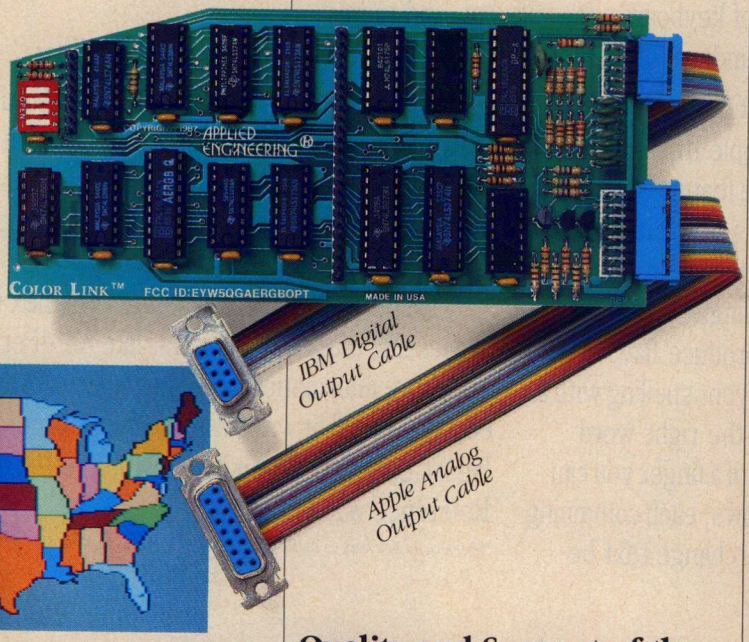
If you've got some other RAM card that's not being recognized by your programs, and you want RamWorks III, you're in luck. Because all you have to do is plug the memory chips from your current card into the expansion sockets on RamWorks to recapture most of your investment!

The Ultimate in RGB Color.

RGB color is an option on RamWorks and with good reason. Some others combine RGB color output with their memory cards, but that's unfair for those who don't need RGB *and* for those that do. Because if you don't need RGB Applied Engineering doesn't make you buy it, but if you want RGB output you're in for a nice surprise because the RamWorks RGB option offers better color graphics plus a more readable 80 column text (that blows away any

composite color monitor). For only $129 it can be added to RamWorks giving you a razor sharp, vivid brilliance that most claim is the best they have ever seen. You'll also appreciate the multiple text colors (others only have green) that come standard. But the RamWorks RGB option is more than just the ultimate in color output because unlike others, it's fully compatible with all the Apple standards for RGB output control, making it more compatible with off-the-shelf software. With its FCC certified design, you can use almost any RGB monitor because only the new RamWorks RGB option provides both the new Apple standard analog and the IBM standard digital RGB outputs (cables included). The RGB option plugs into the back of RamWorks with no slot 1 interference and remember you can order the RGB option with your RamWorks or add it on at a later date.

ColorLink™ RGB Option



magazine said "RamWorks is the most powerful auxiliary slot memory card available for your IIe, and I rate it four stars...For my money, Applied Engineering's RamWorks is king of the hill."

"I wanted a memory card for my Apple that was fast, easy to use, and very compatible; so I bought RamWorks."

Steve Wozniak, the creator of Apple Computer

Apple experts everywhere are impressed by RamWorks' expandability, versatility, ease of use, and the sheer power and speed that it adds to any IIe. With a RamWorks in your Apple, you'll make IBM PC's and AT's look like slowpokes.

True 65C816 16 Bit Power.

RamWorks III has a built-in 65C816 CPU port for direct connection to our optional 65C816 card. The only one capable of linearly addressing more than 1 MEG of memory for power applications like running the Lotus 1-2-3™ compatible program, VIP Professional. Our 65C816 card does not use another slot but replaces the 65C02 while maintaining full 8 bit compatibility.

Endorsed by the Experts.

A+ magazine said "Applied Engineering's RamWorks is a boon to those who must use large files with AppleWorks...I like the product so much that I am buying one for my own system." inCider

Quality and Support of the Industry Leader.

RamWorks III is from Applied Engineering, the largest, most well supported manufacturer of Apple peripherals and the inventor of large RAM cards for the Apple. With our 5 year no hassle warranty and outstanding technical support, you're assured of the most trouble free product you can buy.

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- Expandable to 1 MEG on main card
- Expansion connector for possible future expansion to 16 MEG
- Can use 64K or 256K RAMs
- Powerful linear addressing 16 bit coprocessor port
- Automatic AppleWorks expansion up to 3017K desktop
- Accelerates AppleWorks
- Built-in AppleWorks printer buffer
- 100% compatible with all standard IIe software
- RamDrive™ and ProDrive™ the ultimate emulation software included free
- Memory is easily partitioned allowing many programs in memory at once
- Compatible RGB option featuring ultra high resolution color graphics and multiple text colors with cables for both the new Apple and standard IBM type monitors
- Self diagnostics software included
- Lowest power consumption (U.S. Patent #4601018)
- Takes only one slot (auxiliary) even when fully expanded
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RamWorks III with 512K	**$249**
RamWorks III with 1 MEG	**$329**
RamWorks III with 1.5 MEG	**$489**
RamWorks III with 3.0 MEG	**$1099**
Ram Expander+ 1 MEG	**$499**
Ram Expander+ 2 MEG	**$799**
65C816 16 Bit Card	**$159**
ColorLink RGB Option	**$129**
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VIP Professional	**$219**

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In addition to running on the IIGS, WordPerfect is available for the IIe/IIc.* And files from both versions can be interchanged with WordPerfect files generated on other machines, including IBM®-PC compatibles and some minicomputers.

No other word processor lets you flex the word processing muscle of your IIGS like WordPerfect.

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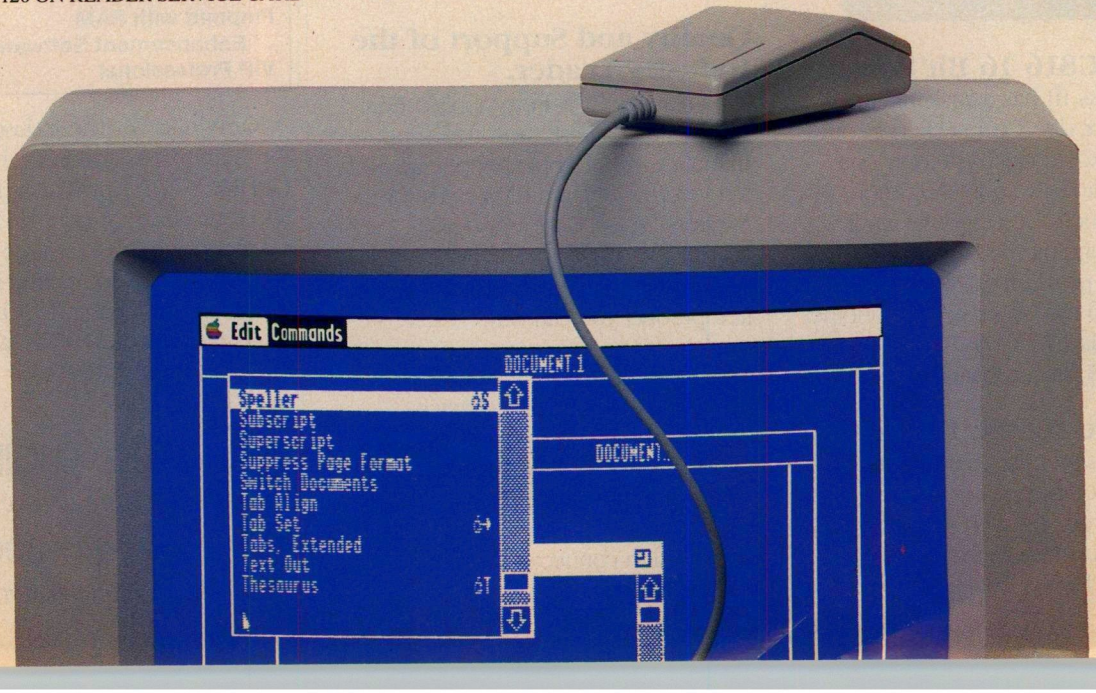
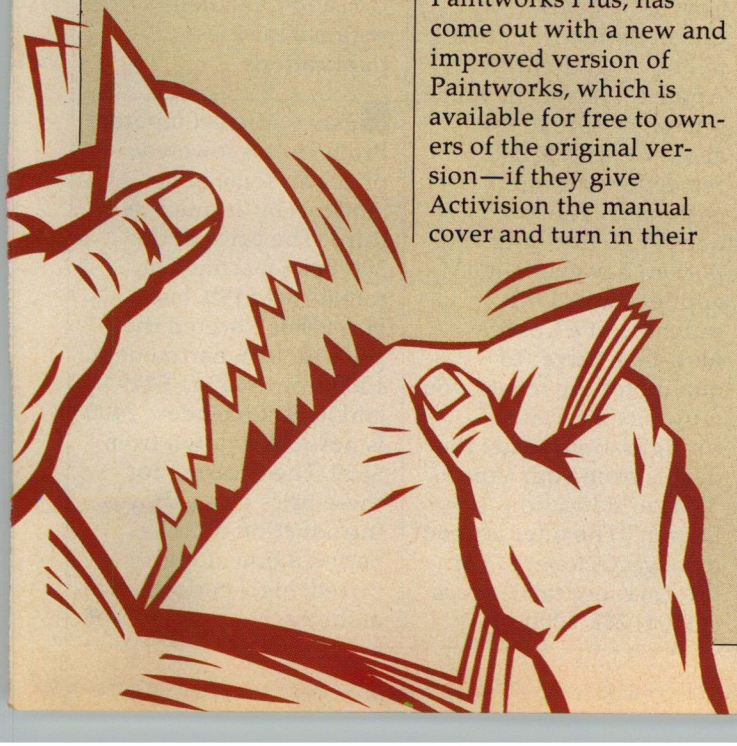


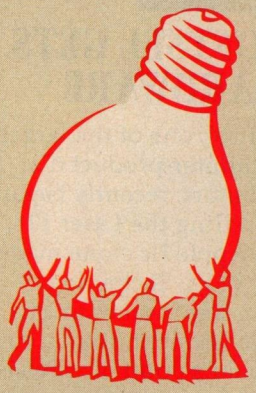
NEWSPLUS

The great cover ripoff, a looming loophole in copyright laws, where the jobs (still) are, and industry updates.

COVER, COVER, WHO'S GOT THE COVER?

If you own the Paintworks Plus paint program for the Apple IIGS, think carefully about how you might like to upgrade the software—two rival upgrade plans each require you to send in the cover of your Paintworks manual. Activision, the maker of Paintworks Plus, has come out with a new and improved version of Paintworks, which is available for free to owners of the original version—if they give Activision the manual cover and turn in their registration card. But Electronic Arts is trying to entice Paintworks owners to switch to EA's newly released DeluxePaint program for the IIGS. If you tear the cover off your Paintworks manual and send it in to Electronic Arts, you get a $50 discount off the suggested retail price of $99.95 for DeluxePaint.





FUNNY YOU SHOULD ASK

Here's an Apple joke that's making the rounds these days:
Q: How many Apple employees does it take to change a light bulb?
A: I don't know. Ask your dealer.

UCLA FINDS LOOPHOLES

Corporate lawyers continue to duke it out in court over copyright laws and their applicability to software programs. The latest brouhaha concerns the University of California at Los Angeles, which was sued by B. V. Engineering, a Southern California software company, which claimed that UCLA had made illegal copies of its programs.

The judge's decision on that suit was a real zinger: He dismissed the case because UCLA was a state institution and therefore not subject to the federal copyright law. As you might expect, B.V. Engineering is appealing the case. Should the lower court's decision be upheld, it could make public a major loophole through which other software-using state agencies could slip. If you're an educator or administrator on a tight budget, this development might sound promising, but if you're a software developer, it could sound pretty grim.

ILLUSTRATIONS BY MAX SEABAUGH

NEWSPLUS UPDATE

SPECIAL ED ON VIDEODISC

Dunamis, a software company specializing in solutions for disabled people, has agreed to market a videodisc product developed at Penn State University. Called the Alpha Interactive Language Series, the videodisc—and Apple IIe software that goes with it—helps disabled people develop reading, writing, and other communications skills. The videodisc allows motion-picture-quality images and animation to illustrate sentences that the computer user constructs. The system is also able to display American Sign Language. Although the system was designed for the hearing-impaired, the company says it can also be used for students who have delayed language development or mild mental handicaps. Also, the system may be appropriate for students learning English as a second language. For further information, contact Dunamis, 2856 Buford Highway, Duluth, GA (404) 476-4934.

WHERE THE JOBS ARE

You remember all the hoopla a few years back about the great job potential in the computer industry—and how that potential waned as more and more computer-science grads flooded the market just as the industry's growth leveled off? Well, there might still be hope, if the Rochester Institute of Technology is reading the cards correctly. RIT says that great potential lies in the field of telecommunications and networking—not surprising when you stop to think what a morass of technical complexity both those areas continue to be. RIT also pegs software management and distributed processing as other promising areas.

SOFTSEL GETS HARDWARE

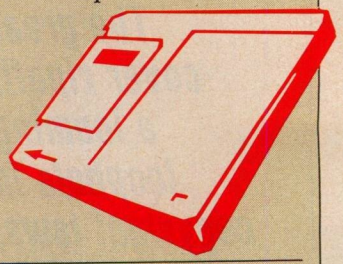
Softsel, one of the largest computer-product distributors, recently began handling the Laser 128, an Apple IIc clone made by Video Technology. The significance of this arrangement, from a consumer's point of view, is that it enables the Laser 128 to become available in more retail outlets. From Softsel's point of view, it makes Softsel's product line even more hardware-oriented, pulling further away from its software-only strategy of a few years ago (prompting a few industry wags to refer to the company now as Hard Sell.)

In our April telecommunications roundup, we may have given the impression that SwyftDisk, a communications program, didn't run on the Apple IIc. SwyftDisk works on the IIc as well as on the IIe.

Compunication, a California distributor of Avatex modems, wrote to us to correct some details about the Avatex 1200hc, which appeared in our April modem chart. Here are the pertinent facts: The 1200hc can indicate an OFF HOOK; it cannot detect a busy signal, other than indicating NO CARRIER on the monitor; it does have a manual speaker control; and it does have full power-up diagnostics.

If you're purchasing Corvus Systems' Constellation III network to hook together the Apple II systems in your school, be sure to ask about Corvus' $1000 rebate for education customers. The money doesn't go into your pocket, however—it applies toward the purchase of a Corvus hard-disk drive. To qualify for the rebate, you must buy a certain configuration, so get the details from your Corvus "Master Education Dealer." The offer is good through October 1. For information, call Corvus at (408) 281-4000.

Davidson & Associates has announced that it will begin making its entire product line of educational software available in a 3.5-inch format. The company will sell 3.5- and 5¼-inch software in separate packages, rather than put both formats in one box, as some publishers do.



Dow Jones News/Retrieval, an on-line service, has begun offering Business Dateline, a database of the full text of articles dating back to January 1985 from more than 130 U.S. and Canadian regional business publications.

Hayes Microcomputer Products has lowered prices on some of its modems by as much as a third. The price of the 300-bps Smartmodem remains at $199, but Hayes has lowered the price on its Smartmodem 1200 from $649 to $449, and its Smartmodem 2400 is now $599, down from $899. The occasion for these price cuts is Hayes' introduction of its V-Series, a line of high-priced, high-performance modems. +

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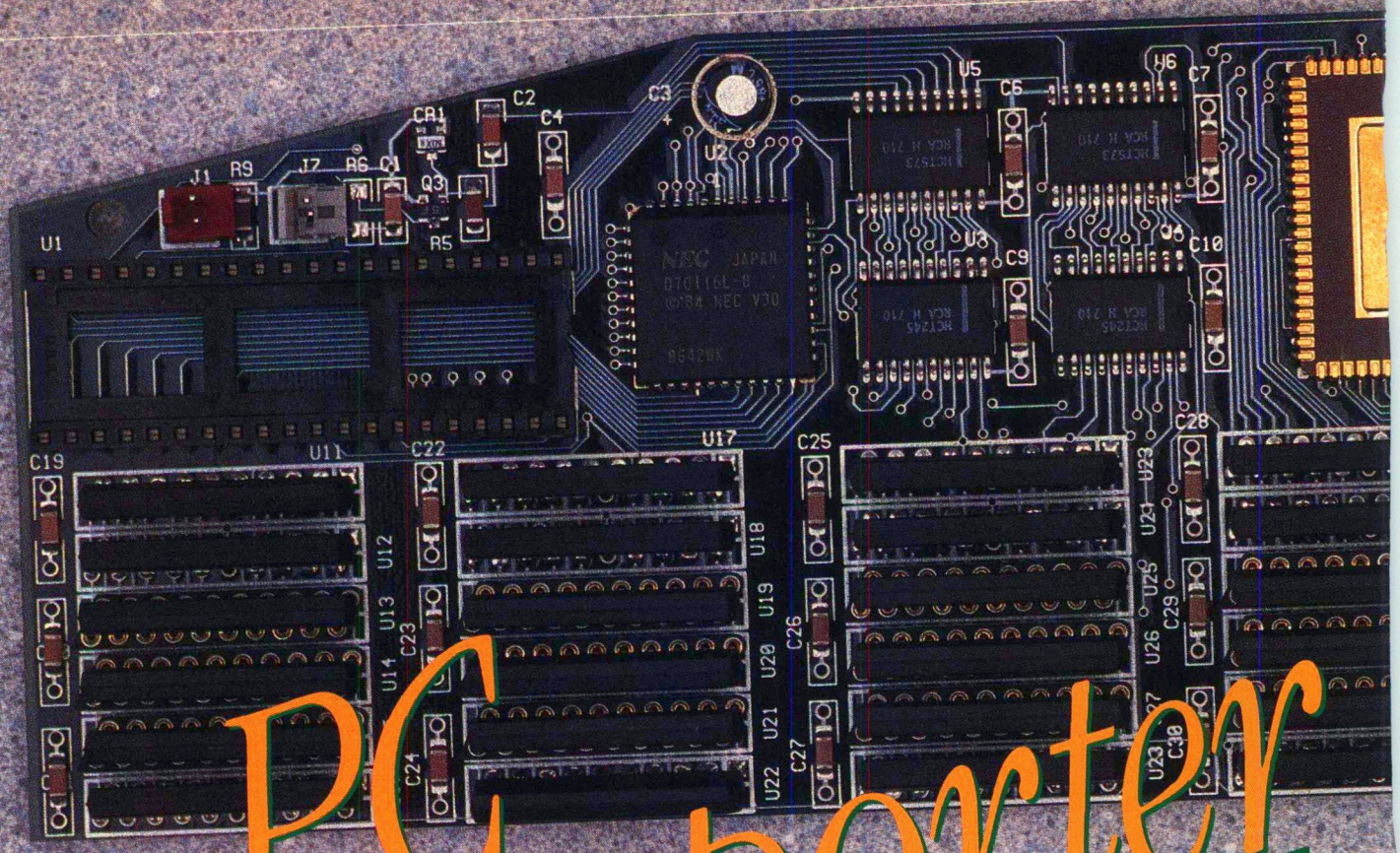


PC Transporter

COVER STORY BY JOHN MARKOFF

An IBM-compatible coprocessor card that gives Apple II users the best of two worlds

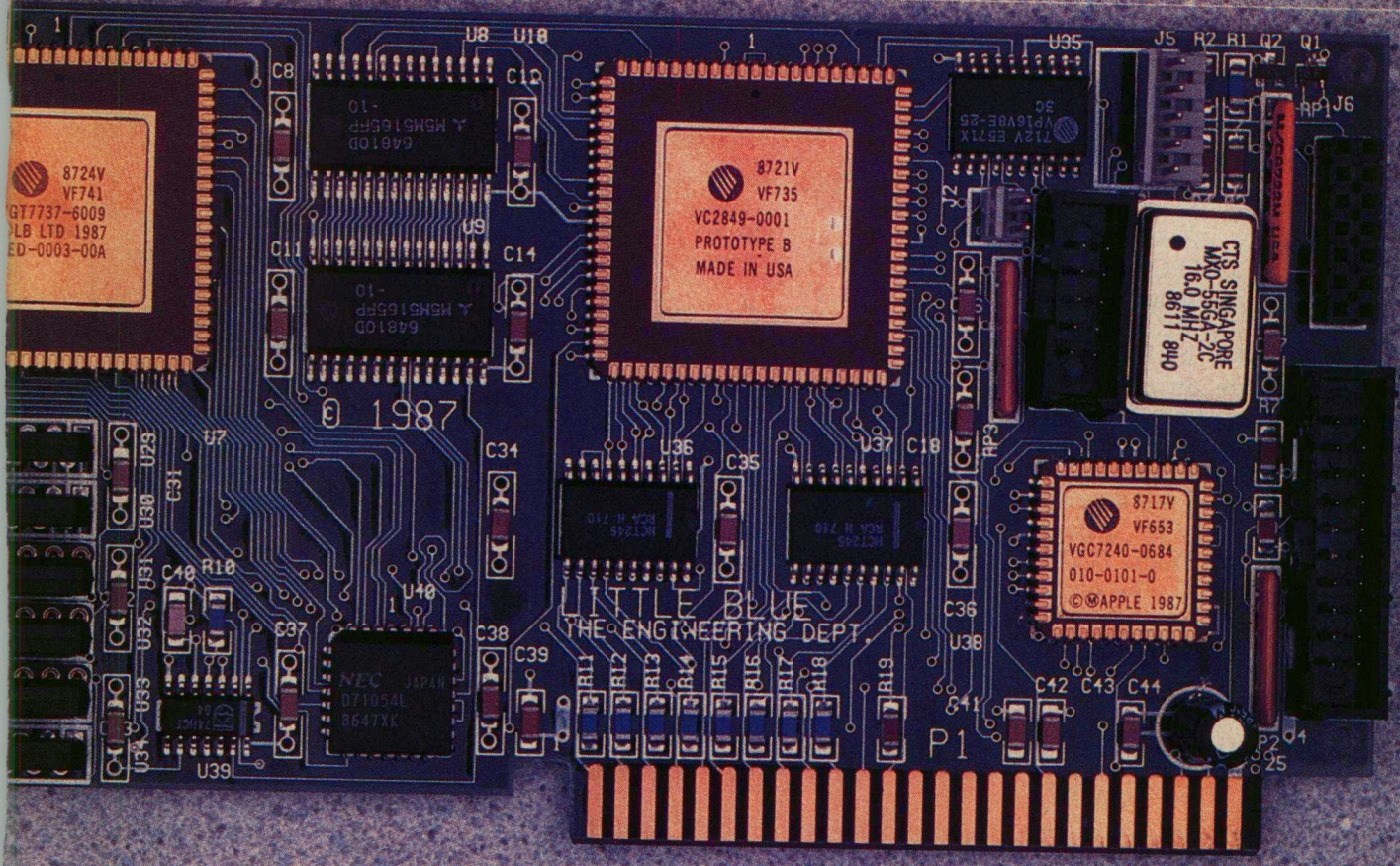
Think of an alliance between the *Star Wars* antagonists Darth Vader and Obe Wan Kanobe. Admittedly an unlikely team, it has certain obvious advantages.

Apple Computer, Inc., and International Business Machines Corporation are the two great opposites of the personal-computer world, but a merger of the two also makes a great deal of sense. After all, the Apple II family of computers is the clear leader in educational software, whereas IBM dominates business markets.

Why not, then, have the best of both worlds? IBM compatibility can give Apple II owners access to the wealth of business software in the MS-DOS world.

Enter PC Transporter, an IBM-compatible coprocessor card from Applied Engineering. Designed by The Engineering Department, a Campbell, California, development group composed of key former Apple Computer engineers, PC Transporter (which was code-named Little Blue) is a combination

PHOTOGRAPHY BY CARTER DOW



of hardware and software—including a set of utility programs—that adapts an Apple II Plus, IIe, or IIGS to the IBM PC and PC/XT world.

Plug PC Transporter into your Apple, and you have an inexpensive IBM-compatible computer that runs the major MS-DOS packages, as well as a large RAMdisk that increases the power of your Apple and a simple means of transferring program data between the IBM MS-DOS and Apple II ProDOS worlds.

Even better, an Apple II with PC Transporter runs faster than a standard IBM PC, in fact almost as fast as an IBM PC/AT. The Engineering Department has chosen a low-power-consuming, true 16-bit, CMOS, 7.2-MHz NEC V30, a chip that has more than twice the speed of the standard Intel 8088 microprocessor of the IBM PC.

I saw PC Transporter running the Norton Utilities benchmark program 3.5 times faster than a run-of-the-mill IBM PC with a 4.77-MHz Intel 8088 microprocessor. The faster processor speed,

An Apple II with PC Transporter runs faster than a standard IBM PC.

along with PC Transporter's 16-bit data bus (vs. the 8088's 8-bit bus), makes this speed possible. (Other benchmarks also show the speediness of PC Transporter. Watch for a complete performance review in an upcoming issue of *A+*.)

Besides speed, the PC Transporter has a range of other features:

The PC Transporter circuit board includes a socket for an Intel 8087 math coprocessor. The 8087 dramatically speeds operations such as recalculating spreadsheets.

Fully configured, the PC Transporter card offers a total of 768K of RAM that you can reconfigure as a RAMdisk when using PC Transporter while running Apple II software. This setup lets the AppleWorks 2.0 desktop, for instance, show 750K of work space.

With PC Transporter, you can easily translate documents between ProDOS and MS-DOS by using an MS-DOS conversion utility from The Engineering Department. It is even possible to use an Apple 3.5-inch disk drive, connected directly to the PC Transporter disk-drive port, to read from and write to specially formatted disks, which can then be directly transferred to the new breed of IBM-compatible portable computers, including the Toshiba T1100, Zenith 181, and NEC Multispeed. PC Transporter is also designed to be compatible with the 3.5-inch disk drives in IBM's new PS/2 series of computers.

Best of all, perhaps, PC Transporter allows you to retain your existing Apple II peripherals. You can use most Apple II monitors (both color and monochrome), printers, and hard-disk drives, rather than having to buy PC-compatible peripherals. To add MS-DOS compatibility, all you need is the PC Transporter package and a single floppy-disk drive that can read PC-formatted diskettes.

(You will also need an IBM-style keyboard if you have an Apple II Plus.)

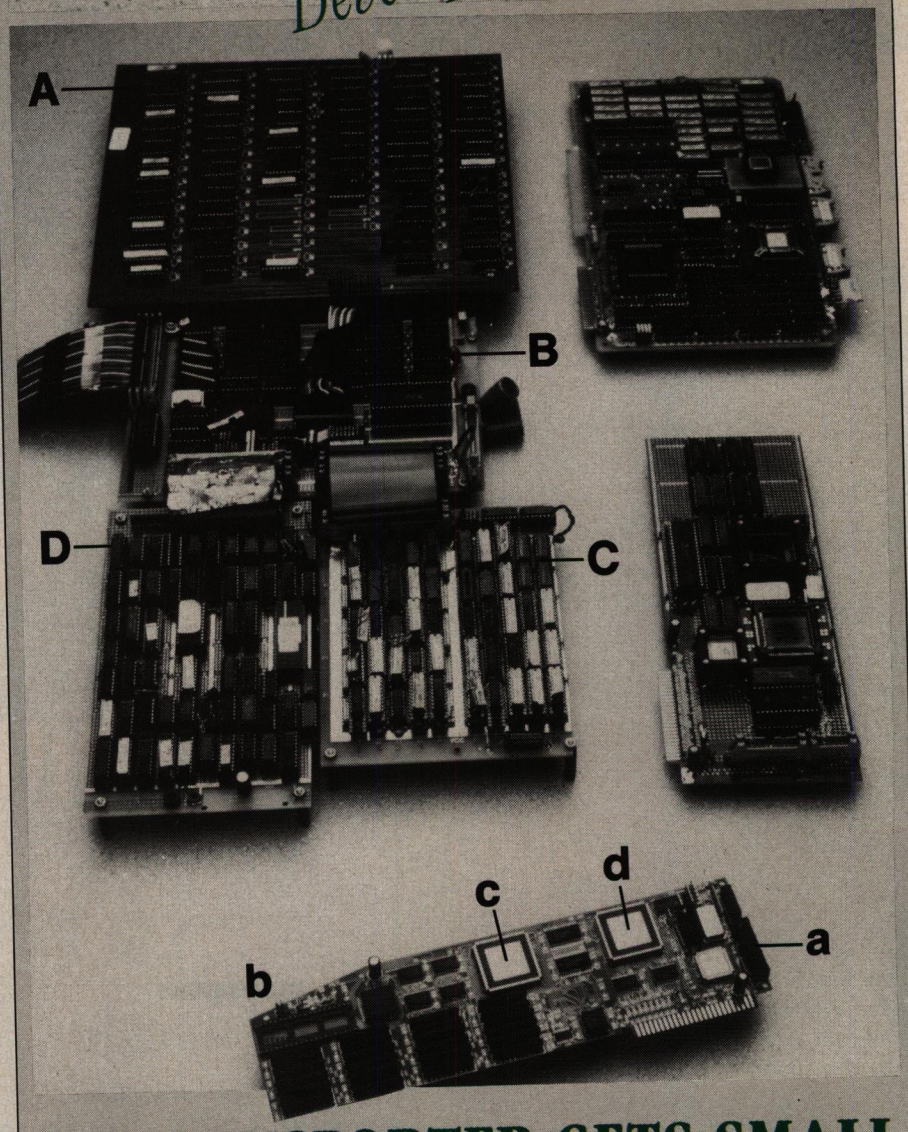
Bringing together two computers as radically different as the Apple II and the IBM PC is a first-class engineering challenge. Although cloning the IBM PC is now common—hundreds of IBM-compatible models are on the market—obtaining the same functionality inside an Apple II requires a more sophisticated approach.

It also requires the expertise of engineers intimately acquainted with both Apple II and IBM hardware and software. The Engineering Department has drawn together the talents of a group of

PC Transporter lets you retain your existing Apple II peripherals.

veteran Apple engineers: Cliff Huston was one of Apple's earliest employees—he helped Steve Wozniak design the disk controller for the Apple II; his brother Dick joined Apple as its first full-time programmer and 25th employee and wrote the ProDOS operating system; Wendell Sander, chief Apple III designer, also designed the Integrated Woz Machine (IWM) chip; Bob Lashley designed modems and local-area networks at Apple; and Peter Quinn was the engineering project manager for the Apple IIe and IIc. It's an impressive group.

Silicon Valley is the best place in the world to undertake a project as complex as creating PC Transporter. Not only is it possible to find engineers who understand the fundamentals of PC design, but the most advanced semiconductor-design houses are here as well. The members of the Engineering Department team have taken circuitry that originally required dozens of separate off-the-shelf chips and squeezed it down so that it now fits comfortably on a single plug-in board (see "PC Transporter Gets Small," this page). The hardware they couldn't fit on the board they have imitated



PC TRANSPORTER GETS SMALL

Like any other circuit board, PC Transporter started out large and got small. The photograph above shows PC Transporter in several stages of development, starting at the upper left and moving clockwise to the bottommost board—the finished product. On the left are four subboards (*A–D*) that were built in the late summer of '86 and linked together to form this early prototype. (The original prototype, not shown here, was built a year earlier to test the product concept.)

A is an early version of the disk controller, which has since been scaled down to the pint-size controller chip (*a*) on the finished board. *B* is the motherboard that contains the RAM, CPU, and math coprocessor, as well as the logic that buffers between the IBM and Apple worlds; it corresponds to *b* on the completed PC Transporter. *C* is the ancestor of the "glue" chip (*c*) that combines the miscellaneous circuitry from the two systems. And *D* is what eventually became the custom video chip (*d*).

In the upper right-hand corner is the first "wire-wrap" version of PC Transporter, meaning the first incarnation of the product in which all the various components reside on the same board. The Engineering Department came up with this board in early 1987.

Midway down the right-hand side is the next iteration of PC Transporter, which came into the world in the spring of this year. If you look closely, you'll notice that it has drastically fewer chips than does its immediate predecessor.

—*Lisa Raleigh*

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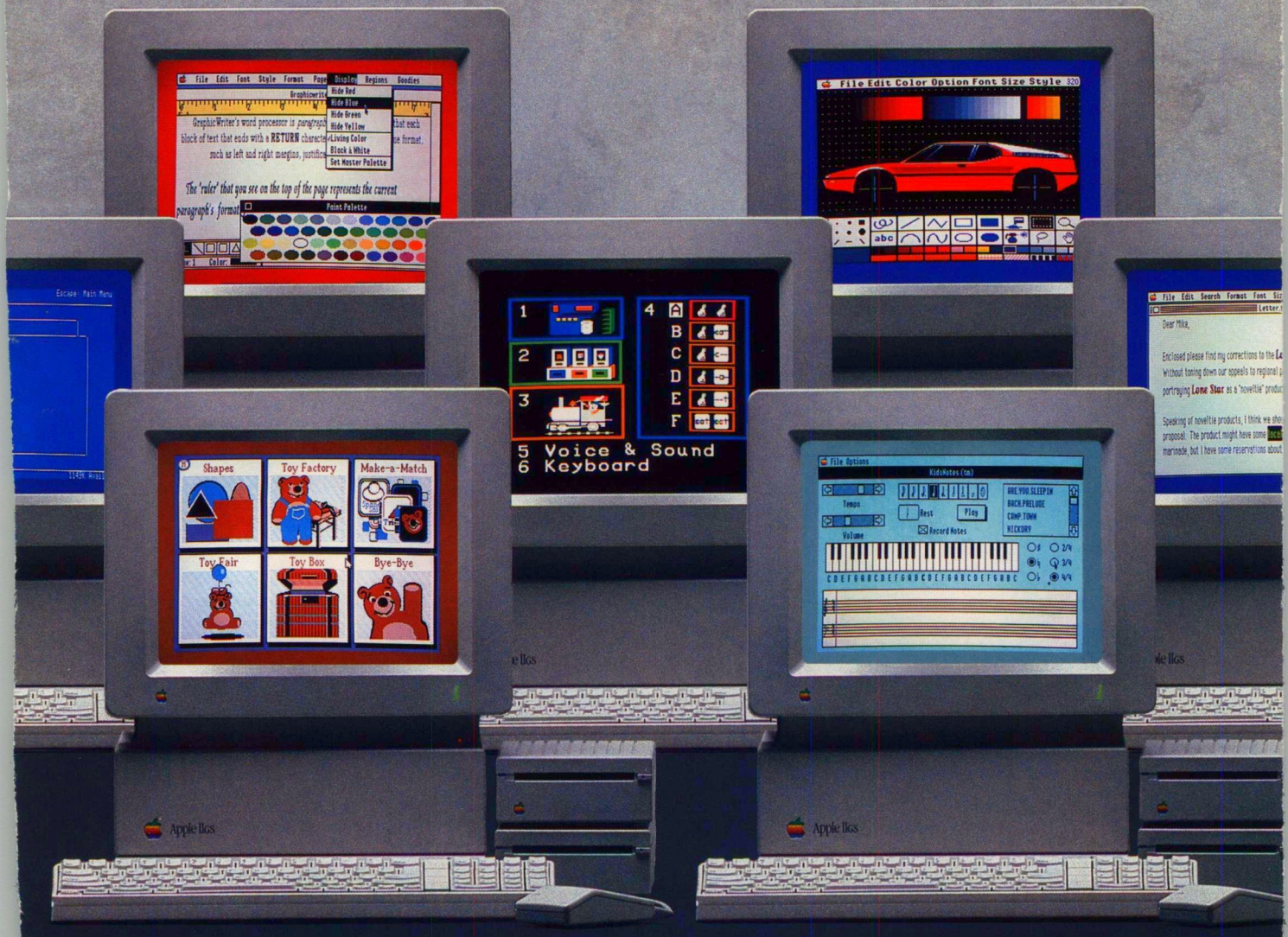

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DeluxePaint II from Electronic Arts—Color Graphics

Visualizer from PBI Software—Business Graphics

The evidence is mounting.
Apple IIgs

in software that runs simultaneously on the Apple II's 6502 microprocessor.

To mimic the IBM PC, The Engineering Department has chosen to shrink most of that computer's functions onto three custom chips. First, a video chip allows PC Transporter to send IBM Color Graphics Adapter (CGA) graphics to either an Apple II monochrome or an analog RGB monitor, or directly to an IBM-compatible digital RGB monitor. (The IBM monochrome monitor doesn't work with PC Transporter.)

Second, a powerful, custom, single-chip disk controller includes the functions of the Apple IWM chip (used in the Apple IIe, IIGS, and Macintosh) plus the ability to read from and write to IBM-compatible drives. The disk-controller chip allows you to connect several types of disk drives to PC Transporter. It is perhaps the most flexible personal-computer disk controller ever designed. You can daisy-chain up to four drives off PC Transporter—as many as two IBM drives and two IIGS-style 3.5-inch drives (officially called Apple 3.5 Drives). The older Apple UniDisk 3.5 drives can't be connected to PC Transporter. The IBM drives may be in either 5¼- or 3.5-inch format.

You can daisy-chain up to four drives off PC Transporter.

Finally, a third, custom, "glue" chip concentrates all the miscellaneous circuitry that normally requires several dozen chips on an IBM PC motherboard. All the custom chips are attached to the PC Transporter board via a technique called surface-mount technology. The advantage to surface-mount is that it creates very reliable products, but the downside is that if the products fail, they are quite costly to repair.

As impressive as PC Transporter's custom very-large-scale integrated-circuit (VLSI) hardware is, the secret of the coprocessor board is the role the Apple II 6502 microprocessor plays in emulating all the hardware ports that normally provide I/O for an IBM PC. While running MS-DOS software, the 6502 operates in the background under the ProDOS operating system.

Every time the PC Transporter coprocessor asks for data from one of its own ports, the 6502 supplies it. The Apple emulates the functions of standard IBM chips and devices such as the 8237A DMA controller, 8259A interrupt controller, 8255A PPI (keyboard, speaker, and switches), game control (through the Apple's game port), parallel interfaces (printers), asynchronous communications (modems), and a hard disk (as a ProDOS volume or file that appears as an MS-DOS volume to PC Transporter). Perhaps most impressive is PC Transporter's emulation of the NEC 765 disk controller; without this emulation, PC Transporter would have a tough time running copy-protected IBM software. A master control program running on the Apple II translates between PC Transporter and various Apple peripherals.

You as a user see only a maximum of 640K out of PC Transporter's total 768K of RAM, because PC Transporter uses the rest of memory for programs that help emulate a PC, as well as for the menu-driven software that helps you configure the system. For example, the Basic Input/Output System (BIOS) takes up 10K of memory, and an extension for the PC/XT fills another 10K. In a PC, the BIOS (a set of low-level software programs that mediate between application programs and the computer hard-

ADDRESSING THE DISK-DRIVE DILEMMA

When you buy PC Transporter, you must also acquire an IBM-style disk drive in order to run IBM software or to load IBM programs and transfer them to an Apple 3.5 drive. To make life easier for its PC Transporter customers, then, Applied Engineering is also selling IBM-compatible drives. These are not just off-the-shelf IBM-type disk drives; they are specially modified to work in an Apple/IBM setup.

The Applied Engineering drives come in a box that's the same size as that of the older Apple Disk II. You can get one or two half-height drives in a single box. The drives come with their own power supply, which relieves the Apple II power supply from the extra load, and also have a little circuit board built in that protects your Apple in case you shut it off but forget to turn the power off on the drives.

The most critical feature, though, is the arrangement of the cable connectors. A standard IBM-style drive comes with a 34-pin connector with which you're supposed to hook up the drive to the computer. Unfortunately, that's not the right pin configuration to connect with PC Transporter, which was designed to let you connect either IBM-style or Apple GS-style drives to it. Thus, PC Transporter favors the Apple pin configuration and has a DB-19 (19-pin) connector for disk drives—and so does the disk-drive set from Applied Engineering.

The back of the drive box also has a DB-19 connector for daisy-chaining Apple 3.5 drives. The drives' internal circuitry has daisy-chain logic built in so that it knows how to handle up to four disk drives.

Of course, you can wire your own cables and connectors for hooking an IBM-type drive to PC Transporter, but you run the risk of blowing the disk-controller chip on the PC Transporter board if you get the wiring wrong. The price for all this equipment is not especially cheap: $239 for a one-drive box and $349 for two. If the functionality of PC Transporter appeals to you, though, the price is probably worth the headaches you'll avoid.

—*Lisa Raleigh*

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ware) permanently resides in read-only memory (ROM). BIOS resides in RAM to save cost and enhance flexibility. Since you load it from disk, rather than burning it into ROM, the task of updating BIOS in the future is simplified.

Starting PC Transporter

To start PC Transporter, you must first load the ProDOS operating system and then run the PC Transporter program on the Apple from the same disk. The PC Transporter program initiates a sequence that begins with a simple series of menus for configuration (see below). Once you set up PC Transporter to match your system software, the special driver programs load into Apple II memory, and then the BIOS from the disk loads into PC Transporter's own RAM memory.

You configure PC Transporter by using a program that you can also access any time PC Transporter is running by holding down the Shift key and pressing Caps Lock twice. It is a ProDOS application running on the Apple II that lets you select items such as printers and printer interfaces, video displays, and communications equipment; set PC Transporter's ports to match standard ports on a PC; adjust settings similar to those set by switches in a PC; set memory configurations; and configure disk-drive arrangements. This "control panel" consists of menus that allow you to load specific drivers, which are ProDOS control programs that govern the devices attached to PC Transporter. Once you set up your configuration, you can save it to your boot disk, which PC Transporter subsequently reads every time you start it. There is also an auto-configure option.

The most challenging aspect of using PC Transporter may be the actual task of installing it in your Apple. Part of the task is straightforward. You can put the PC Transporter card into any of your Apple II's expansion slots (the higher-numbered the better), except the auxiliary slot on the IIe, the memory-expansion slot on the IIGS, or slot 0 on the II Plus. After you've installed the card, the more arduous task is connecting it to its life-support system through a series of cables and connectors. Separate cable kits are available for the Apple IIe and IIGS. (At press time, Applied Engineering said it would probably bundle these cables with the PC Transporter card as well as provide them separately.) You need an additional cable to connect a II Plus to an IBM-compatible keyboard.

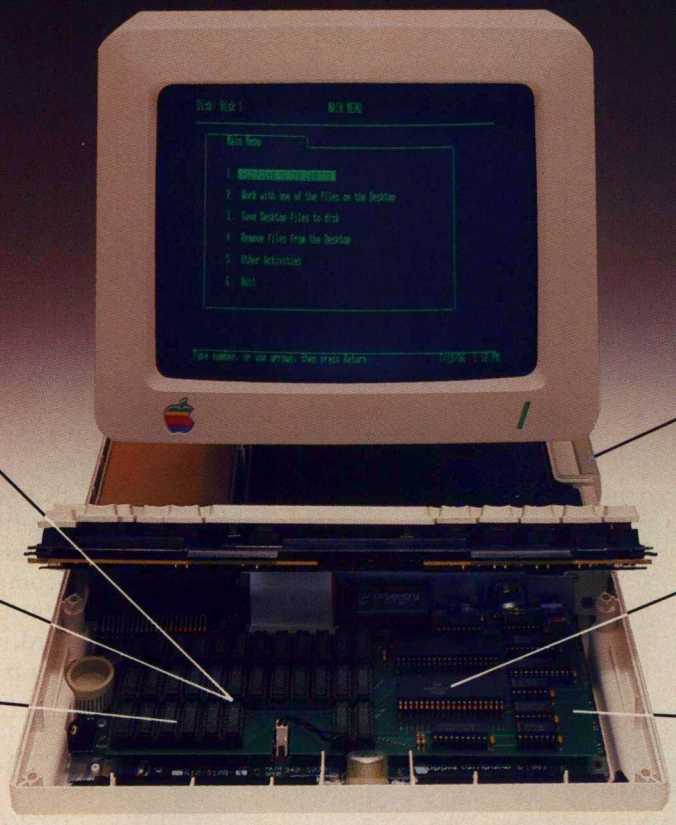
For the IIe, the connections include a speaker connector and an optional keyboard connector that lets you add an IBM keyboard. If you don't opt for the latter, you must connect your IIe keyboard cable to the PC Transporter card. In addition, there's a composite video jumper that you need if you are using an Apple monochrome composite monitor, plus a 19-pin disk-drive port and an optional analog RGB connector port. The II Plus setup is similar, except that you must add an IBM-style keyboard to use PC Transporter because the II Plus keyboard doesn't have enough possible key combinations to simulate an IBM keyboard. With the IIGS, you don't need to worry about the keyboard, speaker, and video-jumper connections, but you must use a video converter that translates PC Transporter's digital video signal into analog for the IIGS's RGB monitor.

The engineering feat of PC Transporter's designers is impressive.

The Monitor

PC Transporter works with one out of three graphics-hardware devices that IBM PC-compatible computers use. Currently the most popular Personal Computer graphics standards are the monochrome text-only mode (Monochrome Display Adapter), high-resolution color (Enhanced Graphics Adapter), and low-resolution color (Color Graphics Adapter).

Although EGA is considered the optimal mode in the IBM world, PC Transporter uses CGA because it is a lowest common denomina-



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tor. Still, it provides adequate resolution with a good monitor. If you have a standard Apple II composite monitor such as the Apple Monitor III or Monitor II, programs running on PC Transporter will appear in the Color Graphics Adapter mode. In this case, a simple gray scale is mapped onto the color output, meaning that you get a monochrome image.

You can also use PC Transporter with a PC-compatible digital RGB monitor. If you have an Apple RGB monitor, you can also use it, but you need a special converter to let PC Transporter work with an analog RGB monitor. If you have two video displays connected when you're using PC Transporter, you can switch back and forth between monitors.

Disk Drives

PC Transporter's design elegance is evident in the single-chip form of the disk controller, which normally takes up an entire expansion card in most PC-compatible computers. The engineering feat of PC Transporter's designers is particularly impressive because PC-compatible disk drives and Apple disk drives use two entirely different recording methods to store information on diskettes.

PC-compatibles employ a method called Modified Frequency Modulation (MFM), whereas Apple-compatible drives use a different technique called Group Code Recording (GCR). Another complication is that the ProDOS and MS-DOS operating systems have very different internal structures. To surmount these obstacles, The Engineering Department had to design an extremely flexible disk controller.

PC Transporter makes a great deal of sense for practical reasons.

As a result, you can simultaneously connect up to four floppy drives directly to PC Transporter: up to two PC-compatible 5¼- or 3.5-inch drives and up to two Apple "Unified" disk drives (meaning the "universal" drives that can work with both the IIGS and the Macintosh). Additionally, you can use a PC-compatible drive as a ProDOS volume when running in the Apple II mode and similarly use a 143K Apple 5¼-inch drive as an MS-DOS volume.

You can also transfer MS-DOS files from ProDOS in order to move data between the Apple II and PC worlds. A special MS-DOS utility program permits you to transfer MS-DOS files on disk drives connected to PC Transporter to and from ProDOS files. File formats are a limiting factor, but ASCII (text) files are easy to transmit from one environment to another.

PC Transporter permits you to access an Apple-compatible hard-disk drive as a PC-formatted hard-

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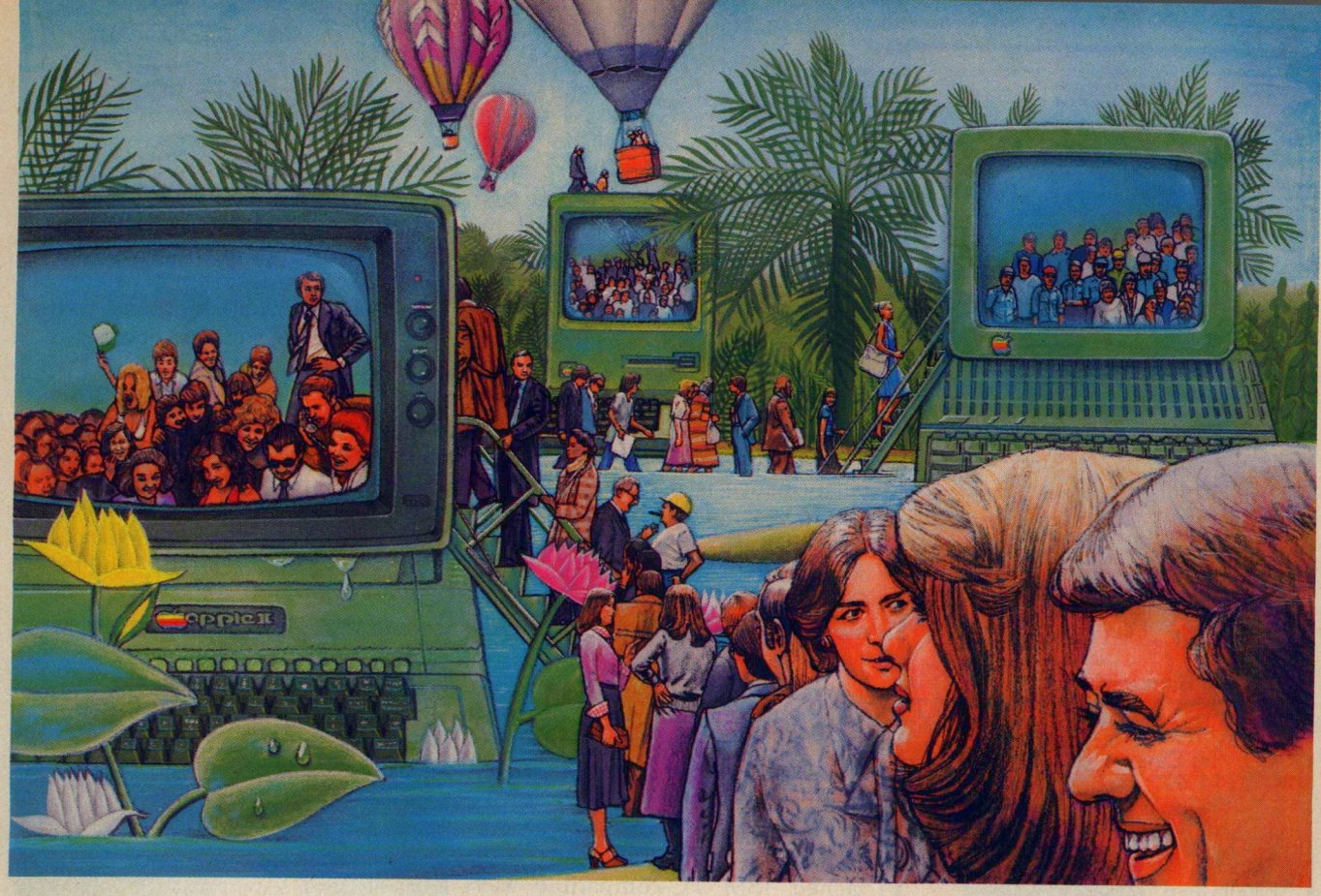

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PC Transporter

disk drive for use by PC-compatible programs. To do so, you first need to prepare the Apple disk by using a selection from the setup menu, which allows you to set aside space on the hard-disk drive, actually creating a special ProDOS file on the disk. To PC Transporter, the file looks like a hard-disk MS-DOS volume on which you can then format and store data. Disk performance is not comparable to the performance of the fastest hard-disk drives available for PC-compatible computers, but using this setup is significantly faster and more convenient than using floppy drives.

The Keyboard

If you have an Apple IIe or a IIGS, you can use the Apple keyboard and emulate a standard IBM PC keyboard through keystroke combinations. If you have an Apple II Plus, you will need an attached IBM PC-compatible keyboard. The PC Transporter card has a special port that can connect to a separate IBM-type keyboard. The problem, of course, lies in the fact that the Apple has fewer keys than the IBM PC. Consequently, PC Transporter interprets Apple key combinations as IBM keystrokes (such as the equivalent of function keys) by requiring you to press certain key combinations that are as easy to use as possible. The PC Transporter card has a jumper connection to the Apple II keyboard-controller chip. The jumper provides separate status for keys, such as the Control key, that are not reported as separate keys through the usual Apple software interface.

Having It Both Ways

PC Transporter is a new alternative for those who have been tempted by the IBM software "standard" but who feel their heart still remains with Apple. It also makes a great deal of sense for practical reasons. It's faster than a PC, it costs less than most clones, and it provides the convenience of easily moving data between the Apple II and IBM formats. Also, consider that buying another computer would take up more than twice the desk space.

When I saw PC Transporter earlier this year, it was still in prototype form, so I could not tell if it would be 100% compatible with the PC world. Its developers aim to make PC Transporter capable of running 99% of all programs written for the IBM PC class of computers, however. Watch for *A+*'s upcoming performance-and-compatibility review to see how well it measures up. ✚

John Markoff has been an editor for both Byte *and* InfoWorld. *He is now a technology reporter for* The San Francisco Examiner.

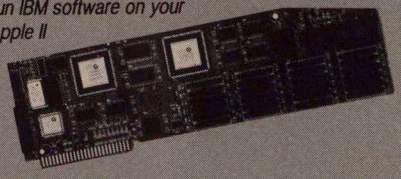
INTERNATIONALLY AVAILABLE

Applied Engineering won't be selling PC Transporter internationally, so if you're interested in the product but you're not in the U.S., you'll need to contact Vortex Corp., 10061 Bubb Road, Cupertino, CA 95014 USA; FAX number (408) 733-9776. Incidentally, Vortex won't be using the name PC Transporter. Instead, it will call the product II Blue.

—Lisa Raleigh

VITAL STATISTICS

PC TRANSPORTER
A plug-in card that lets you run IBM software on your Apple II



CPU: *Apple II Plus, IIe, or IIGS*
RAM: *64K*
DISK DRIVES: *At least one Apple-compatible disk drive (Disk II, 5¼-inch drive, or Apple-compatible 3.5-inch drive running off a disk controller separately from PC Transporter) and at least one PC-compatible disk drive (5¼-inch double-sided/double-density or 3.5-inch drive, to connect to PC Transporter)*
OPERATING SYSTEM: *ProDOS; IBM PC-DOS or Microsoft MS-DOS Version 2.0 or greater (must be purchased separately); PC-compatible keyboard (for Apple II Plus)*
COPY-PROTECTION: *No*
MOUSE: *Works with AppleMouse*
LIST PRICE: *$499 (At press time, Applied Engineering said this price would probably include cable kits, which would also be sold separately for the IIe and IIGS for $40–$50.)*

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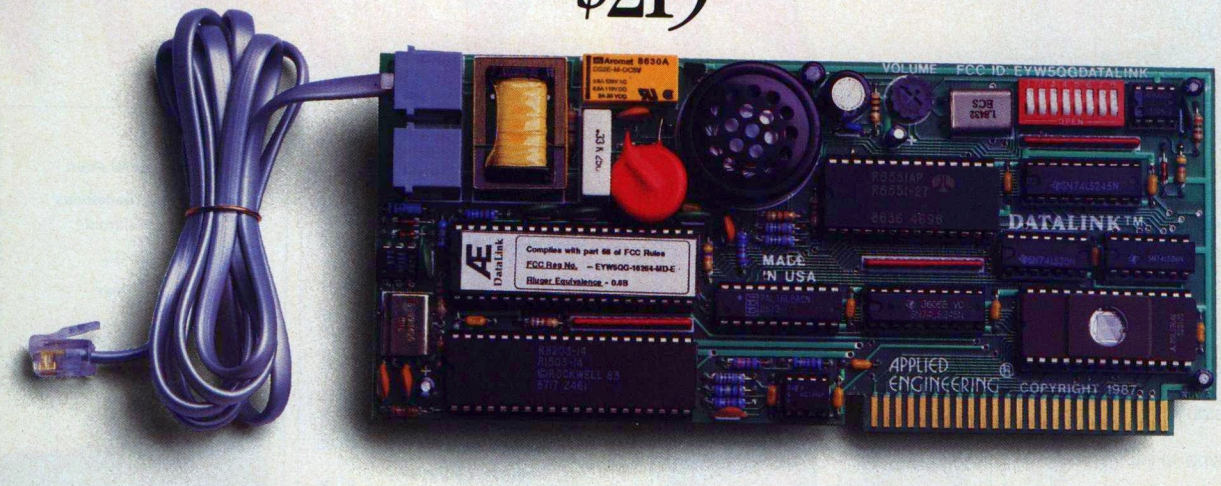

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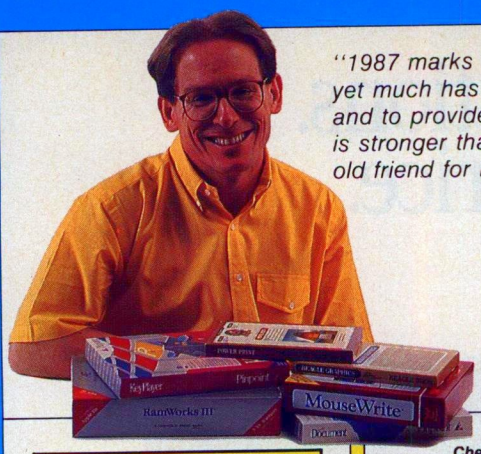

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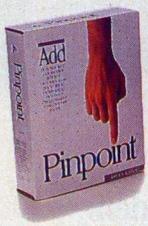

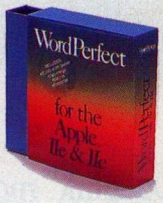

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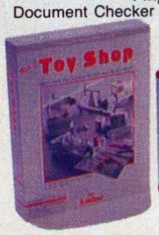

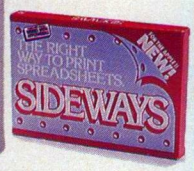

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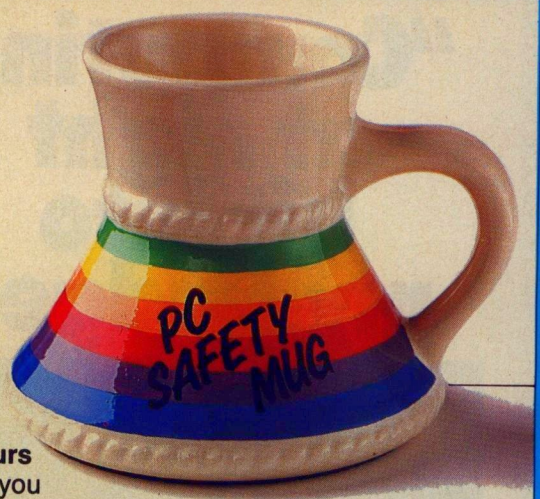

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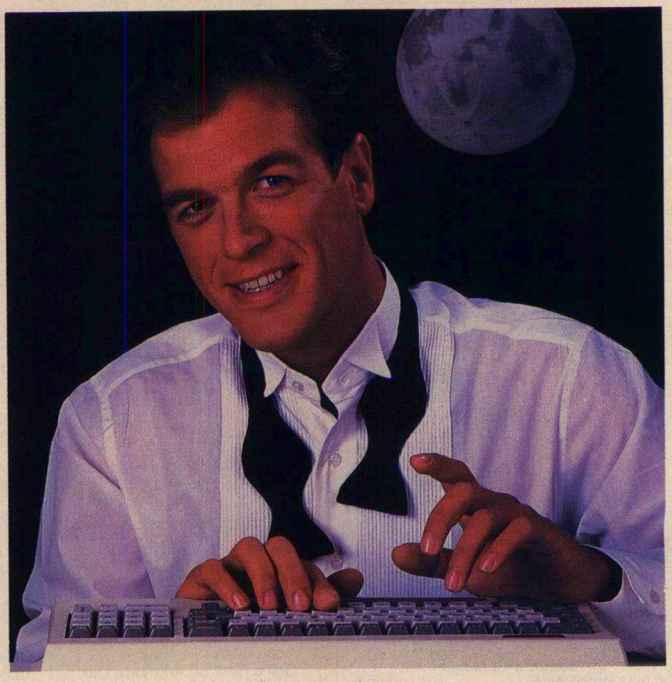

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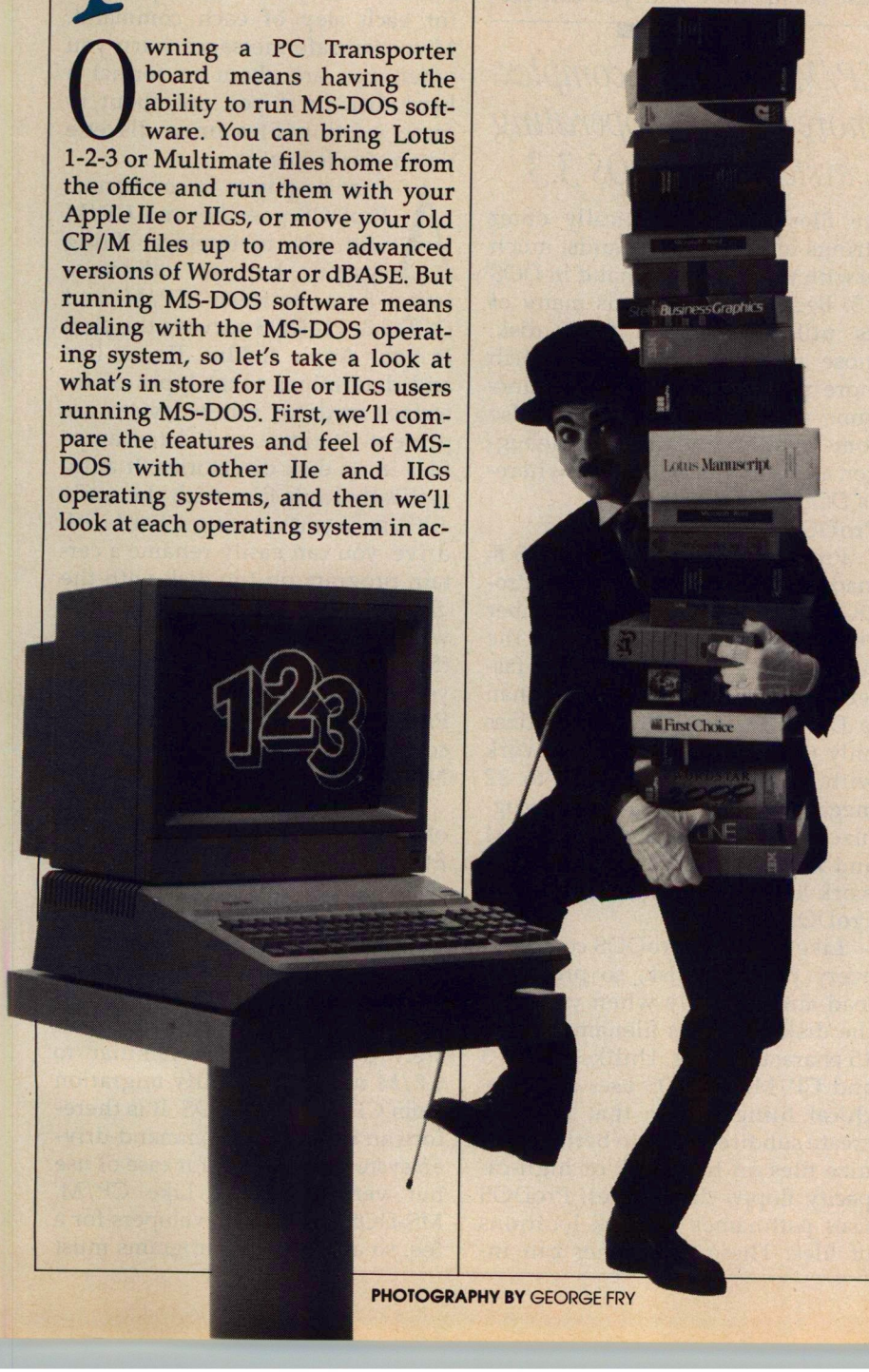
An overview of operating systems

COVER STORY BY CHARLES RUBIN

Moving Over to MS-DOS

Owning a PC Transporter board means having the ability to run MS-DOS software. You can bring Lotus 1-2-3 or Multimate files home from the office and run them with your Apple IIe or IIGS, or move your old CP/M files up to more advanced versions of WordStar or dBASE. But running MS-DOS software means dealing with the MS-DOS operating system, so let's take a look at what's in store for IIe or IIGS users running MS-DOS. First, we'll compare the features and feel of MS-DOS with other IIe and IIGS operating systems, and then we'll look at each operating system in action. Little of your specific knowledge about Apple operating systems will carry over to MS-DOS, so be prepared to do some homework if you're new to MS-DOS.



PHOTOGRAPHY BY GEORGE FRY

DOS 3.3

DOS 3.3 is the last version of the original Apple Disk Operating System that debuted in 1978 with the Disk II floppy-disk drive. Originally designed to work with an Apple II with 16K of RAM, DOS is a compact and simple, yet fairly convenient, operating system. It provides direct access to up to 64K of memory, but it recognizes storage volumes up to only 143K in size. The small volumes force hard-disk users to create a series of phantom 143K volumes for data storage.

The major ease-of-use feature of DOS 3.3 comes from Apple's philosophy about how it distributes its operating systems. Apple supplies DOS 3.3 and ProDOS for free, so the operating system is included on the majority of Apple II program disks. You can simply insert the disk and turn on the computer, and the software boots automatically. (In contrast, CP/M and MS-DOS users must first load the DOS from a separate disk and then type the name of a program's start-up file to run it.)

Because of its original 16K memory constraints, DOS is largely a command-driven operating system. You use such commands as INIT, CATALOG, LOCK, and UNLOCK to work with files. The exceptions are the COPY, FID, and MUFFIN programs, which require loading from

disk and offer menus that step you through the process of copying or converting disks or files. DOS 3.3 accepts filenames up to 30 characters long, which allows descriptive monikers.

DOS 3.3 lets you chain files together and monitor the output of a file on the screen as it is being written to disk. You can also create small programs that automatically enter a string of DOS commands, by using the EXEC command. You must manually tell your Apple to run such programs—they can't start themselves automatically.

CP/M

Although not available for the Apple II Plus until 1980, when Microsoft introduced the Softcard, CP/M is the oldest operating system in this group. It dates back to the mid-1970s and was the standard operating system for microcomputers used in business. By the time the Softcard had been out a couple of years, more CP/M users had Apple II, II Plus, and IIe machines than any other brand of computer.

Overall, CP/M is a more complex, more powerful operating system that is somewhat harder to learn than DOS 3.3. Users get little help from the CP/M manual, which is a classic example of poor documentation. CP/M recognizes up to 64K of memory directly and can work with storage volumes of up to 16 megabytes, so it is far better suited to systems with hard-disk drives than is DOS 3.3. Filenames can be only eight characters long, with a three-character extension. Instead of identifying storage devices as Drive 1 or 2 (as with DOS 3.3), CP/M uses A, B, C, and so on as drive specifiers.

CP/M was initially designed to fit into 4K of memory, so it is an entirely command-driven operating system that loads most of its functions from files on disk as you request them. To copy a file, for example, you type the name of the copy program, called PIP, on the CP/M disk, and PIP loads. You then use commands to tell PIP what to do.

Unlike DOS 3.3, CP/M has to be loaded into your computer first. You then type the name of the start-up file for the program you want to run. You can copy the CP/M software onto the same disk as a program and then patch the boot track on the disk so the program automatically loads when you boot the disk, but doing so requires the use of the CP/M debugger—a feat beyond the capabilities or desires of many users.

Although it is more difficult to learn than DOS 3.3, CP/M is much more powerful. You can use passwords to protect files from unwanted access. You can date- and time-stamp files, and you can create files that automatically enter strings of CP/M commands, much as with the EXEC command in DOS 3.3. Because CP/M loads many of its utility programs from disk, those utilities tend to be much more powerful than similar functions under DOS 3.3. CP/M also comes with a line editor, a debugger, and a macro assembler, whereas DOS 3.3 doesn't.

CP/M is a more complex, more powerful operating system than DOS 3.3.

ProDOS 8 and ProDOS 16

ProDOS, later called ProDOS 8, made its debut in March 1984. ProDOS 16 appeared in September 1986, with the introduction of the Apple IIGS. ProDOS is six times faster at loading and saving files than is DOS 3.3. ProDOS 8 recognizes only 64K of RAM, but it can work with storage devices of up to 32 megabytes. ProDOS 16 can recognize up to 16 megabytes of RAM and works with the AppleTalk network but is otherwise similar to ProDOS 8.

Like DOS 3.3, ProDOS comes on every program disk, so programs load automatically when you boot the disk. It allows filenames up to 15 characters long. Unlike DOS 3.3 and CP/M, ProDOS uses a hierarchical filing system that lets you create subdirectories to better organize files on hard-disk or high-capacity floppy-disk drives. ProDOS uses pathnames to track locations of files. These pathnames can include directory and subdirectory names as well as filenames. The advantage to pathnames is that ProDOS can find a file you specify, no matter which disk drive it resides on. ProDOS recognizes disks or hard-disk volumes by names you assign them, but you can also refer to floppy disks by the number of the disk drive they occupy.

ProDOS was designed for systems with a minimum of 64K of RAM, and its relatively large size makes it an extremely easy operating system to learn. You select most of its commands from a series of menus, and you receive prompts for each step of each command. Many fail-safe messages warn you when you are about to format a hard disk or if you are about to erase existing files on a diskette when you format it.

As far as power is concerned, ProDOS goes beyond CP/M with its hierarchical filing system but is otherwise somewhere between CP/M and DOS 3.3. ProDOS surveys the slots in your Apple II Plus, IIe, or IIGS and determines what types of interface cards or other devices are present. It time- and date-stamps files in its disk directories. It automatically loads files with the suffix .SYS, so if you're using a hard-disk drive, you can easily rename a certain program on the disk with the .SYS suffix so it automatically loads when you boot from a disk. Other than with the .SYS suffix, however, you can't create files directly with ProDOS that automatically execute commands.

MS-DOS

MS-DOS began life as a knockoff of CP/M that was designed to fit into 40K of RAM. Current versions of MS-DOS occupy about 55K. MS-DOS recognizes up to 640K of RAM and can work with storage devices of up to 32 megabytes. The commands and operating style of MS-DOS were deliberately designed to be familiar to CP/M users, to simplify migration from CP/M to MS-DOS. It is therefore an exclusively command-driven system: not much for ease of use but very powerful. Like CP/M, MS-DOS is sold to developers for a fee, so all MS-DOS programs must

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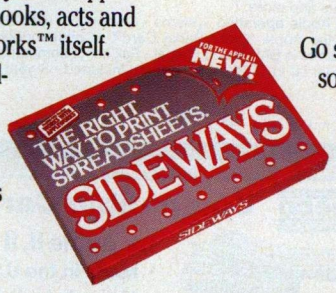

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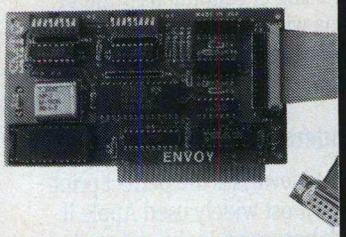

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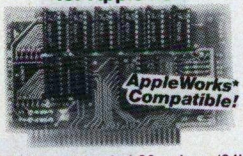

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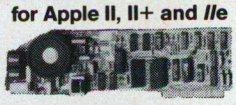

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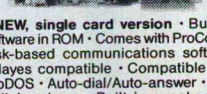

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be loaded separately after you've loaded the operating system itself.

Like ProDOS, MS-DOS uses a hierarchical filing system that lets you use subdirectories to organize files on a disk. It uses A, B, C, and so on as disk-drive specifiers. It time- and date-stamps files, and it lets you create batch files that automatically execute a series of DOS commands. You can set batch files to run an application program automatically when you boot a disk, and the batch files can respond to user input and perform many other marvels. MS-DOS also has a built-in line editor and debugger.

MS-DOS makes no advances over CP/M in ease of use.

Overall, MS-DOS gives you much more control over your computer system and peripherals, but it makes no advances whatever over CP/M in ease of use. You can easily erase the contents of a hard disk with one command, and MS-DOS won't warn you. MS-DOS presents error messages when you do something wrong, but it does little to explain what you've done wrong.

I could go into much more detail about features of these operating systems, but a quick way to get a better feel for them is to compare how they act in the real world. Formatting a disk, copying a disk, and copying a file are three tasks that almost every computer user has to perform from time to time.

Formatting a Disk

DOS 3.3—Type INIT HELLO, Volume, Slot, Drive. To initialize a diskette in disk drive 1, for example, you type INIT HELLO V254, S6, D2 (the V254 is optional).

CP/M—Type FORMAT Drive Specifier. To format a disk in drive A, for example, you type FORMAT A:. Next, the formatting program loads from disk and prompts you to insert a blank diskette into the appropriate drive. Once you've done that, you press the Return key. Each CP/M system has a slightly

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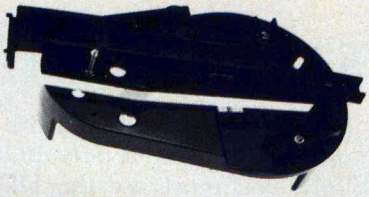

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BY GARY LITTLE

OPERATING-SYSTEM COMMAND COMPARISON

Here's a quick cheat-sheet of operating-system commands for MS-DOS, ProDOS, Apple DOS 3.3, and CP/M. You'll notice that to perform certain operations in ProDOS, you must go into the FILER utility program, whereas in MS-DOS you simply type in the command at the system prompt. Similarly, you must use the FID and COPYA program in Apple DOS 3.3 to perform the equivalent of certain MS-DOS commands. Some commands have no equivalents in other operating systems. Some MS-DOS commands are loaded into memory from disk when you enter the command. A command that the computer loads into memory from disk when you issue it is known as a transient command, because it is deleted from the computer's memory after you finish using it.

Command Description	Microsoft MS-DOS[1]	Apple ProDOS	Apple DOS 3.3	CP/M
Changes the active directory	CHDIR	PREFIX	(2)	USER[3]
Checks disk and reports status	CHKDSK	Use FILER	Use FID	STAT
Compares two files	COMP	Use FILER	(4)	(4)
Copies a file	COPY	Use FILER	Use FID	PIP
Displays/changes the date	DATE	(8)	(5)	(5)
Lists filenames in a directory	DIR	CATALOG	CATALOG	DIR
Copies a disk	DISKCOPY	Use FILER	Use COPYA	PIP
Deletes a file	ERASE	DELETE	DELETE	ERA
Formats a disk	FORMAT	Use FILER	INIT	FORMAT
Renames a disk volume	LABEL	RENAME	(7)	(7)
Creates a disk directory	MKDIR	CREATE	(2)	(3)
Renames a file	RENAME	RENAME	RENAME	REN
Removes a disk directory	RMDIR	DELETE	(2)	(3)
Displays/changes the time	TIME	(8)	(5)	(5)
Displays contents of a text file	TYPE	(6)	(4)	TYPE
Verifies integrity of a file	VERIFY	VERIFY	VERIFY	(4)

1. Versions 2.0 or higher
2. Apple DOS 3.3 does not have commands such as CHDIR, MKDIR, and RMDIR because it uses only one directory.
3. CP/M has multiple user areas within a single directory. It does not have a hierarchical directory structure like that of MS-DOS or ProDOS.
4. No standard command
5. Apple DOS 3.3 and CP/M do not time- and date-stamp files.
6. It is possible to add a TYPE command to ProDOS when Applesoft is active. See "A TYPE Command for ProDOS," *Softalk*, June 1984, pp. 157–165, and "Adding a TYPE Command to ProDOS," *Call-A.P.P.L.E.*, May 1984, pp. 42–49.
7. Apple DOS 3.3 and CP/M do not use volume names.
8. ProDOS does time- and date-stamp files, but it has no standard commands for setting the time and date.

different formatting procedure, so the foregoing may not be the exact commands on your system.

ProDOS 8/16—Type V (Volume Commands) from the Main Menu; choose F (Format a Volume) from the Volume Commands menu, type the slot and drive numbers or accept the defaults; then type the volume name or accept the default.

MS-DOS—Type FORMAT Drive Specifier. To format a disk in drive A, for example, you type FORMAT A:, just as you would with CP/M.

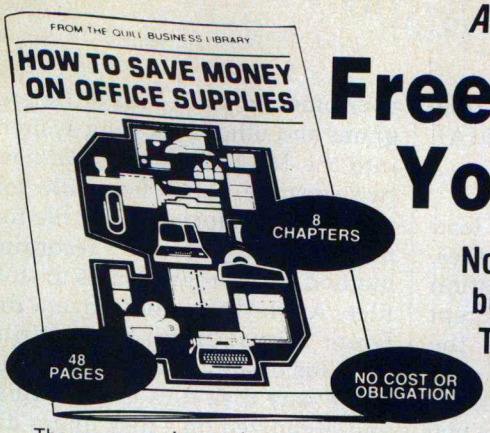
Copying a Disk

DOS 3.3—Type RUN COPYA; then type the slot and drive numbers or accept defaults by pressing the Return key. DOS 3.3 automatically formats the destination disk before copying onto it. It can automatically overwrite any existing information on the destination disk without warning.

CP/M—Type PIP B:=A:*.*. You must format the destination disk before issuing the PIP command.

ProDOS 8/16—Type V (Volume Commands) at the Main Menu, type C (Copy a Volume) from the Volume Commands Menu, type the slot and drive numbers or accept the defaults by pressing the Return key, and then type the new volume name or accept the default by pressing the Return key. ProDOS automatically formats the destination disk and warns you if the destination disk isn't blank. You can then choose to format it or use another disk.

MS-DOS—Type Diskcopy A: B:.



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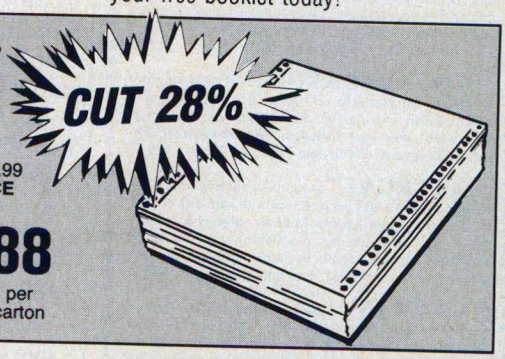

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PC Transporter

You must format the destination diskette with a separate FORMAT command before copying.

File Copying

DOS 3.3—Type BRUN FID to load FID, type 1 to choose Copy files, type the source and destination slot and drive numbers or accept the defaults, and then type the source file name. You can use wild cards to copy several files or all the files on a disk. DOS 3.3 warns you if a file with the source name already exists on the destination disk and asks if you want to replace it or use a new filename.

You won't have to worry about translating from one disk format to another.

CP/M—Type PIP B:=A:Filename. This command replaces any existing file with the same name without warning.

ProDOS 8/16—Type F (File Commands) from the main menu, Type C (Copy Files) from the File Commands menu, and then type the source and destination pathnames. You can use wild cards to copy more than one file or have ProDOS stop and ask if you want to copy each file on a disk as you come to it. ProDOS also tells you if a file already exists on the destination disk and lets you rename it or replace it.

MS-DOS—Type Copy Filename Drive Specifier. To copy the file Letter from drive A to drive B, for example, you type COPY Letter B:.

As you can see, CP/M and MS-DOS have much more economical commands, whereas the Apple operating systems offer more help and safeguards for users. If you know all the commands for MS-DOS, you can probably perform operations with it much faster than with ProDOS or DOS 3.3 (which require you to step through menus), but learning MS-DOS commands is much harder in the first place.

Moving Files into MS-DOS

One of the key issues for would-be users of PC Transporter is whether you can transfer files from your older Apple II Plus or IIe programs and other operating systems into the MS-DOS world. We have two separate issues here: file formats and disk formats. The file format is the specific recording method each program uses to store files. AppleWorks files have a different format from Apple Writer files, for example. The disk format is the way disk files are identified and organized on a disk under different operating systems; ProDOS, DOS 3.3, CP/M, and MS-DOS all use different disk formats.

Fortunately, PC Transporter has a built-in, "transparent" utility that automatically translates ProDOS disk formats into MS-DOS disk formats. (ProDOS itself has a utility to translate files or disks with the DOS 3.3 format into the ProDOS format, and third-party utilities already exist for translating CP/M-format disks into MS-DOS-format disks.) With a utility like this, you won't have to worry about translating from one disk format to another, and you can move files from one operating system to another by using standard file formats such as ASCII or DIF.

In the absence of such a utility, moving files from one operating system to another is a little more complex. If you are transferring from CP/M to MS-DOS, you can use one of the existing third-party utilities for translating disk formats. Once you have a CP/M file in the MS-DOS format, then you can either load it directly with some programs (such as WordStar, dBASE II, or SuperCalc), or you can use the ASCII or DIF file formats to move files between programs.

Eventually, Applied Engineering or some other developer will probably offer software that does specific file-format translations between popular programs such as AppleWorks and Lotus 1-2-3. When that day arrives, you can skip the step of fussing with ASCII and DIF file formats to move data between your Apple II and MS-DOS. +

Contributing Editor Charles Rubin is the author of five books about personal computing, the latest of which is Microsoft Works *from Microsoft Press.*

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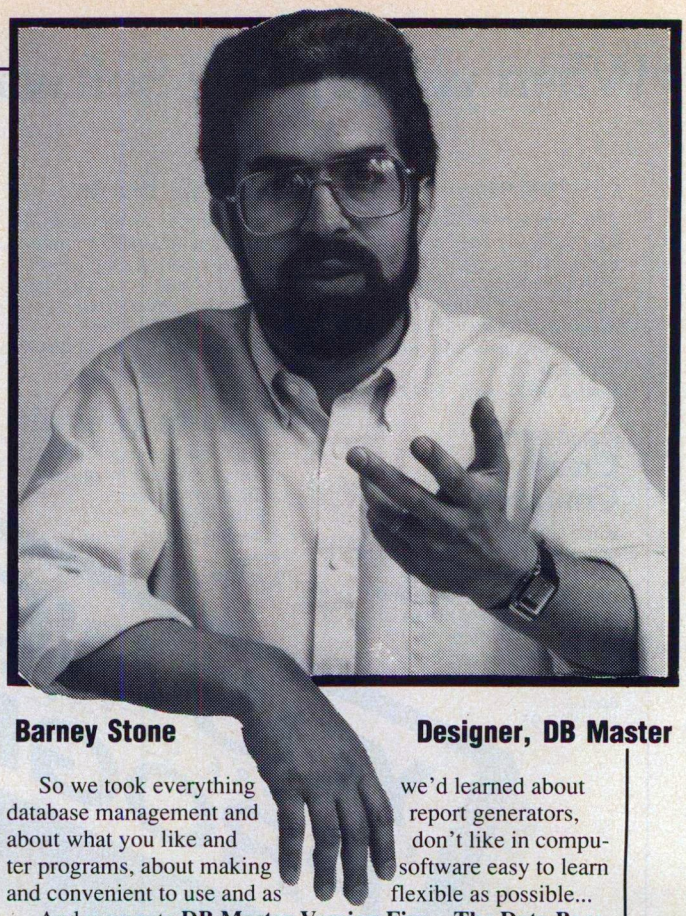

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- 200 fields/record
- 30 screen pages/record
- 250 characters in alphanumeric fields
- Hard disk files—up to 40 Megabytes
- Floppy disk files—up to 50 disks

Field Types:
- Alphanumeric, 1 to 250 characters
- Numeric—3 types
- Dollar/cents, to $99,999,999,999,999.99
- Yes/No—only accepts "Y" or "N"
- Date—11 formats available
- Add Date—date when record was added
- Edit Date—last date when record edited
- Add Time—time when record was added
- Edit Time—time when record last edited
- User Defined—for phone & social security numbers, part #'s, etc., 2-20 characters, control over type of characters allowed in each position
- Label Only—no input area—useful for customizing screens

Computed Fields:
Floating point numeric, dollar & date fields can be computed fields.
Examples: (the F stands for Field)
F10 = F7+F8+F9+.06*F12
F28 = F10*(F50>=F10)+F50*(F50<F10)
F5 = (F10>100 AND F20< 1000) OR (F27 > F26)

Report Generator:
- report width: 20 - 255 characters
- up to 255 lines/record on up to 3 pages
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- column subtotals and totals, page #s, record #s, & date or time report is printed can be printed anywhere on the page or in header and/or footer lines
- set justification, printstyles, case conversion, number formatting, statistics, date formats, etc. on field-by-field basis
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Æ Update . . .

AE's IIc System Clock now includes AppleWorks 2.0 support for time and date screen display and file stamping. This latest update now supports all versions of AppleWorks from 1.0 to 2.0. Using the IIc System Clock's pass-through serial port, the IIc clock can plug into either of the Apple IIc's built-in modem or printer ports. Then, the modem or printer can plug directly into the IIc System Clock. Three "AA" batteries keep the correct time for up to 2 years before simple replacement is necessary. Current IIc System Clock owners can upgrade to the new IIc System Clock Utilities, version 3.0.2 for $10.00.

ColorLink, a new version of the RamWorks RGB option, is now shipping. ColorLink allows connection of an IBM 9-pin RGB monitor or the new Apple IIGS analog color RGB monitor to the Apple IIe. AE's previous version, called Digital Prism, supported the discontinued Apple Color 100 RGB monitor. ColorLink has the same $129.00 retail price and allows the user a choice of viewing either white, blue, green or amber text. Digital Prism will still be available for Apple Color 100 monitor owners. Feel free to call Applied Engineering for advice on RGB monitors you can use with your system.

Parallel Pro will soon be shipping from Applied Engineering. Parallel Pro is an intelligent parallel printer interface card designed for the Apple II Plus, IIe and IIGS. Powerful features like Apple IIGS super high resolution graphics, mixed text and graphics, as well as screen dumps are fully supported by Parallel Pro. An optional 8K to 256K buffer card that plugs directly into Parallel Pro will also be available. The optional buffer card can accept standard 64K or 256K chips in any combination up to 256K total. In fact, the 64K or 256K chips can be recognized by the optional buffer card individually or in a set of 8. (256K of buffer memory is equivalent to approximately 250 typewritten pages of text.)

AE's 16K Pocket Rocket is available to Apple II Plus owners to expand a 48K machine to 64K of memory. The original 16K card had a chip count of 22. The new Pocket Rocket (it fits in a shirt pocket) has a chip count of only 4. The 16K Pocket Rocket has the Applied Engineering no hassle 5 year warranty. Applied Engineering continues to provide new product support and innovative developments for Apple II Plus computers.

Applied Engineering is shipping the new 2 MEG Plus for expanding RamWorks II and RamWorks III boards up to 3 Megabytes of memory. The 2 MEG Plus piggyback uses standard 1 MEG DRAMS and is expandable to 2 MEG. With 1 MEG installed, the 2 MEG Plus retails for $499.00. Fully populated with 2 MEG, it sells for $799.00.

Applied Engineering is seeking an experienced 6502 machine language programmer to develop software and firmware for its expanding line of Apple peripherals. Minimum 2 years of Apple programming experience required. Send your resume to Applied Engineering, P.O. Box 798, Carrollton, TX 75006, Attention Personnel.

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PICK OF THE CROP *BY DENISE CARUSO*

Products for drawing, reading, printing, and generally cloning around with your Apple II

PRODUCT SPOTLIGHT

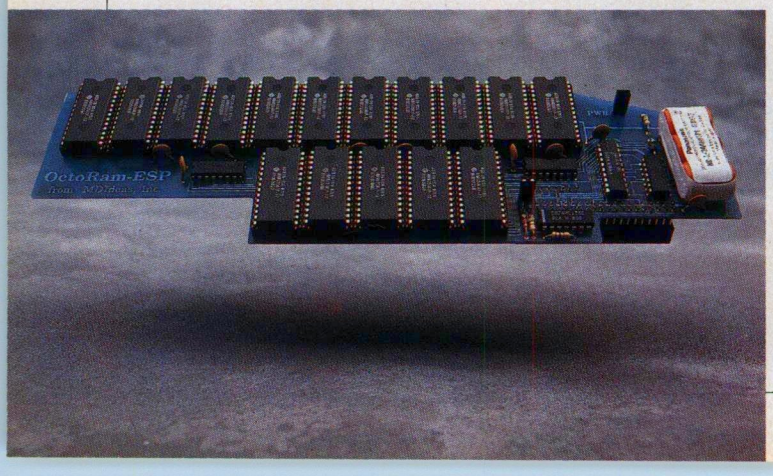
OCTORAM GIVES YOU STATIC

Most random-access memory boards use dynamic RAM, so if you power down, honey, your data is g-a-a-a-wn. But a new piggyback board for the Apple IIGS from MDIdeas, called OctoRam ESP, uses static RAM chips and an on-board battery that together can store the programs and data you load onto this board. Not only that, but you can also boot from the OctoRAM and launch right into your favorite programs. The OctoRAM ESP attaches to MDIdeas' OctoRAM memory card.

The OctoRAM package consists of a board with 128K of static RAM (expandable to 512K in 64K increments), installation software on 3.5-inch disk, and a manual.

OctoRAM
List Price: $179.95; additional 64K increments, $35 each; 512K configuration, $389.95
Requires: Apple IIGS, one 3.5-inch disk drive. ProDOS; installation software not copy-protected; mouse optional.
MDIdeas
1163 Triton Drive
Foster City, CA 94404
(415) 573-0580

CIRCLE READER SERVICE NO. **401**



CLONING AROUND

You can acquaint yourself with the principles, tools, and applications of recombinant DNA with a new program from HRM Software called Genetic Engineer's Toolbox. Nucleotides, bonding, and pairing are reviewed in Part 1. Part 2, a presentation of the tools genetic engineers employ, makes use of metaphors to explain how DNA is "designed"—scissors show how restriction enzymes "cut" DNA, for example. Part 3 shows real applications, such as the production of insulin via bacterial host cells.

Developed at the University of Melbourne in Australia, the program is useful for grades 7 through college, though any concerned citizen might find it useful.

Genetic Engineer's Toolbox
List Price: $69
Requires: Apple II Plus, IIe, IIc, or IIGS; 64K RAM; one 5¼-inch disk drive. DOS 3.3; copy-protected; does not work with mouse.
HRM Software
175 Tomkins Avenue
Pleasantville, NY 10570
(800) 431-2050
In NY, AK, or Canada, call collect (914) 769-6900

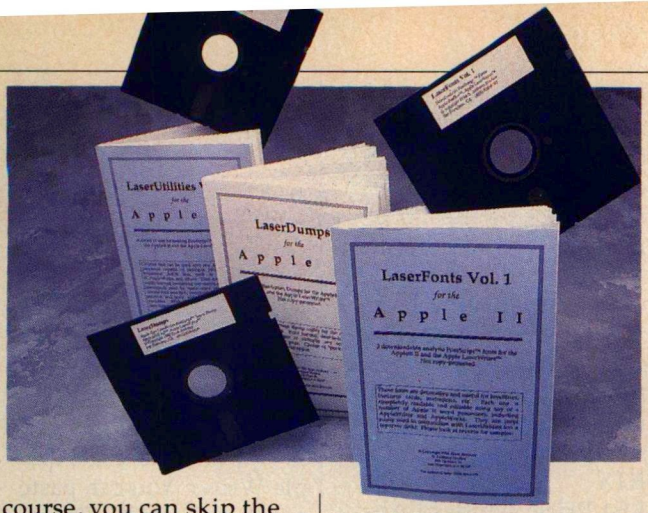
CIRCLE READER SERVICE NO. **402**

IS THERE A STAGE IN THE HOUSE?

If for some reason you don't think kids in grades 6 through 9 are dramatic *enough*, give 'em a copy of Show Time. Show Time helps students learn about plays, play writing, and putting together a production by working through all the elements of the real thing—characters, backdrops, props, music, and scripts—and then using stage direction to put the whole thing together for a performance

on the computer. The program's creators call it "theater-in-a-box."

The scripts students write in Show Time include instructions for everything from filling the stage to playing music and speaking lines. After the script has been put together, either as a whole or in parts on separate computers in the classroom, Show Time rehearses the script and finds any errors. Of



course, you can skip the rehearsal and go right to opening night—but you can't make any changes at that point; thus an age-old lesson is learned: Practice makes perfect.

Show Time
List Price: $49
Requires: Apple II Plus, IIe, IIc, or IIGS; 64K RAM; one 5¼-inch disk drive; printer. DOS 3.3; copy-protected; does not work with mouse.
Minnesota Educational Computing Corporation
3490 Lexington Avenue
North St. Paul, MN 55126
(612) 481-3500

CIRCLE READER SERVICE NO. **403**

POSTSCRIPT FOR THE II, TOO

You don't need a Macintosh to do professional-style desktop publishing. You can use your Apple II with this gaggle of laser-printer utilities that work with the PostScript page-description language, which is built into the Apple LaserWriter. If your Apple II word-processing program can save or print straight, sequential ASCII text (that includes Apple Writer II and AppleWorks, among others), you can use LaserUtilities Volume 1 to do tricks such as producing full-justified, centered, or ragged-right lines or paragraphs; font changes within a line or a paragraph; automatic page numbering; lines; and other PostScript graphics.

LaserFonts Volume 1 provides three downloadable analytic (i.e., not bit-mapped) PostScript fonts, scalable from "ridiculously small to ridiculously large."

And last, LaserDumps is a menu-driven dump utility that lets you print virtually any Apple II bit-mapped hi-res screen. You can print normal, double-hi-res, or quad-hi-res images at virtually any scale.

LaserUtilities, Volume 1, LaserFonts Volume 1, and **LaserDumps**
List Price: $39.95 each
Requires: Apple IIe, IIc, or IIGS; 64K RAM; one 5¼-inch disk drive; SuperSerial Card; Apple LaserWriter printer (IIc requires latest version of ROMs and LaserWriter Plus). LaserDumps runs only with DOS 3.3; ProDOS version of Apple Writer is best for LaserUtilities and LaserFonts; not copy-protected; does not work with mouse.
S. Anthony Studios
889 De Haro Street
San Francisco, CA 94107
(415) 826-6193

CIRCLE READER SERVICE NO. **404**

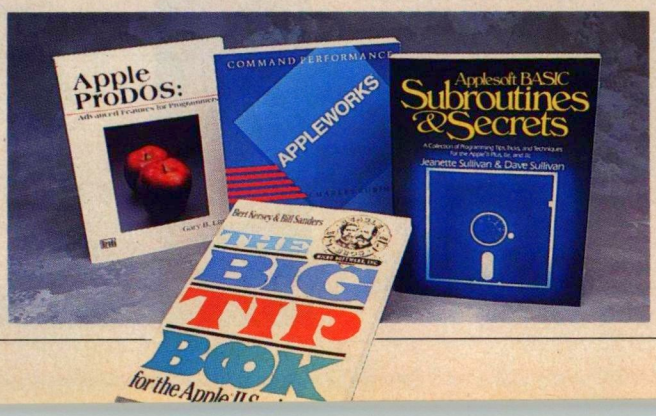
GET BOOKISH

The Small Computer Book Club is for anyone who wants to keep up with the latest information from technowriters. The trial-membership "Apple Set" goes for $4.95 (plus shipping and handling)—a $74.80 value—and includes *Apple ProDOS* by *A+* Contributing Editor Gary Little, *Applesoft BASIC Subroutines and Secrets*, *The Big Tip Book for the Apple II Series* by Bert Kersey and Bill Sanders, and *Command Performance: AppleWorks* by *A+* Contributing Editor Charles Rubin.

The club claims its books aren't economy editions but are "always of equal quality to publishers' editions."

Here's the small print: When you join, you agree to buy at least three selections or alternate selections in a year. To join, send your name, firm (if you want the books sent to your office), address, city, state and ZIP code to **Small Computer Book Club,** Riverside, NJ 08075-9889

CIRCLE READER SERVICE NO. **405**



IT'S A DRAW

If you've been pining away for a MacDraw-like product for your Apple IIGS, you're in luck. Activision has just brought out Draw Plus, a structured drawing program that lets you create designs and drawings with a palette of shapes and objects. With it, you can create floor plans, letterhead, flowcharts, organization charts, landscape design, or anything else for which you'd need a set of two-dimensional-design tools. Draw Plus allows you to create your own set of "icons" for use whenever you create a Draw Plus file. Also, you can save Draw Plus files in a format that you can open and use in Writer's Choice Elite and Paintworks Plus, two other IIGS products from Activision, Inc.

Draw Plus
List Price: $79.95
Requires: Apple IIGS, one 3.5-inch disk drive, mouse. ProDOS 16, copy-protected.
Activision, Inc.
2350 Bayshore Parkway
Mountain View, CA 94043
(415)960-0410

CIRCLE READER SERVICE NO. **406**

PRODUCT SPOTLIGHT

MODEM MAGIC

Sophisticated telecommunications is within your reach. The Modem MGR telecommunications program can handle transmission rates up to 19,200 bps, works with most of the popular modems and peripheral cards for Apple II computers, and provides easy access to parameter changes. It also sports a handy capture buffer that lets you scroll through all received text and then lets you decide if you want to print it, write it to a disk file, transmit it to another system, or edit it.

Modem MGR is loaded with other features, too. Fast video routines help you avoid losing received data at high speeds, you can split your screen between the text you're receiving and the text you send, and you can use a full-screen text editor online. The program also includes the essential ability to create macro script files. In addition, it can answer your phone for you and leave messages or exchange files with your system. You can customize the program to your own hardware, too, via individual drivers.

Modem MGR
List Price: $49.50 plus $3 shipping
Requires: Apple II Plus, IIe, or IIc; 48K RAM (with DOS 3.3) or 64K RAM (with ProDOS); modem or direct wire connection. ProDOS or DOS 3.3; not copy-protected; does not work with mouse.
MGR Software
305 South State College Blvd., Suite 101
Anaheim, CA 92806
(714) 993-0294
CIRCLE READER SERVICE NO. **411**

GETTING YOUR KIX

If you're one of those crazy dreamers who's always thought, "If only I could add the power of UNIX to my ProDOS and AppleWorks," your day in the sun has arrived.

KIX, a disk-file and management system, installs on your AppleWorks disk and gives you a new operating environment to hop in and out of. Without exiting from AppleWorks or slogging through all those menus, you can get some basic file management done at a keystroke and return to AppleWorks in a flash.

KIX is modeled after UNIX and is compatible with "virtually" all ProDOS-based software. Some of the things you can do with KIX include controlling directories; manipulating files; comparing files and volumes; searching files and directories; and making hardware and firmware calls such as setting a system time and date, 40/80-column video outputs, or screen-to-printer dumps.

KIX
List Price: standard Apple II version, $49.95; IIGS version, $69.95
Requires: Apple II Plus, IIe, IIc, or IIGS; 64K RAM; two 5¼-inch disk drives; RAMcard, UniDisk 3.5, or hard disk recommended. ProDOS; not copy-protected; does not work with mouse.
Kyan Software
1850 Union Street #183
San Francisco, CA 94123
(415) 626-2080
CIRCLE READER SERVICE NO. **412**

A MAC IN YOUR IIGS

Who needs to spend six or seven big bills on a color Macintosh II system? If you have a IIGS, you can buy software such as Styleware MultiScribe GS that offers not just color, but also pull-down menus, fonts, character sizes and styles, and multiple windowing.

MultiScribe also makes it easy for you to import foreign ASCII text files created by programs such as AppleWorks and Apple Writer. You can paste graphics from TopDraw and Deluxe Paint, among others, right into documents. And document size is limited only by available memory.

Color editing, LaserWriter printing, and picture management are included in the latest version of MultiScribe, which the company expected to be shipping by mid-July of this year pending Apple's release of Version 2.0 of the IIGS system software.

MultiScribe GS
List Price: $99.95
Requires: Apple IIGS, one 3.5-inch disk drive. ProDOS 16; copy-protected; can work with mouse.
StyleWare, Inc.
5250 Guitton
Suite 2E (cute, eh?)
Houston, TX 77081
(713) 668-1360
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AE APPLIED ENGINEERING™

RamWorks III™ If you have a IIe this card is perfect and if you use AppleWorks, it's an absolute must! Applied Engineering was the first company to expand AppleWorks and they're always 6-12 months ahead of the competition. And you can stay current with our FREE SOFTWARE UPGRADES. Why settle for a partial compatible when you can have a real RamWorks at a discount price.

RamWorks III 256K **$159**
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RamWorks III 1 MEG **$259**
RamWorks III 1.5 MEG **$389**

65C816 16 Bit Card Requires RamWorks II or III and Apple IIe. **$149**

RamWorks RGB Option Even if you bought a RamWorks just to use the RGB option, it would be worth it. Runs both Apple and IBM RGB monitors, and is compatible with Apple's standard for RGB, includes cables. **$99**
(See our new RGB monitor ar right.)

TransWarp™ We tested all the accelerators and TransWarp was 20-300% faster than the others. Runs cool too! **$219**

Z-80 Plus™ Runs all CP/M® software. Includes operating system and manual, a great value. **$109**

Timemaster H.O.™ Timemaster H.O. has the most features and is the easiest to use. It comes with more software than any other clock card. It even adds 15 new commands to BASIC! **$79**

Phasor Simply the best sound and speech synthesizer for the II+, IIe, or IIGS. **$139**

SerialPro A powerful multifunction card with serial ports and clock/calendar **$129**

Viewmaster 80™ Super resolution 80 column card. Total software compatibility and everything you need to run AppleWorks on a II+ or Franklin. **$109**

RamFactor™ If you have a II+ or would rather use slots 1-7 in your IIe or IIGS, RamFactor is for you. It is fully compatible with Apple's memory card, runs AppleWorks on a IIe, II+ or IIGS and has a battery back-up option.

RamFactor 256K **$189**
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GSRAM 512K **$179**
GSRAM 1 MEG **$249**
GSRAM 1.5 MEG **$319**
GSRAM Plus 1 MEG **$379**
GSRAM Plus 2 MEG **$619**

IIc Clock™ Clock/Calendar for IIc **$39**

Z-RAM Ultra — For all IIc's

Ultra 1: Memory Only	256K	**$169**
	512K	**$209**
Ultra 2: Memory & Clock	256K	**$209**
	512K	**$249**
	1 MEG	**$319**
Ultra 3: Memory, Clock & CP/M	256K	**$259**
	512K	**$299**
	1 MEG	**$369**

More Quality Products

Ultra Hi-Res RGB Monitor/TV This Sony RGB monitor uses a 13" ultra hi-res CRT for super sharp 80 column text and great graphics. Works with the IIe and IIGS. But in addition to being the best RGB monitor available this unit is also a 180 channel cable-ready television set with remote control. Try it. You WILL like it.
(List $625) Only **$489**

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5-1/4" Disk Drive Super quiet direct drive compatible with all Apple software and Apple controller card. A top quality unit with 1 year warranty. Add $20.00 for IIc/IIGS Cable. Only **$119**

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Internal 1200 Baud Modem Cermetek 1200, for Apple IIe, II+ and IIGS runs at 1200 and 300 baud. Auto-dial, auto-answer with built-in speaker. Hayes compatible, with built-in communications software. Comes complete with phone cable and manual. (List $299) **$146**

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Pinpoint's AppleWorks Accessories The best available and they are written to fully utilize Applied Engineering's RAM cards. (Includes RAM enhancement software.) Together a $118 value. Only **$59**

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MacroWorks and Super MacroWorks ". . . the best single AppleWorks add-on available today." A+ Magazine. Add new word processing power, create your own Macros and save lots of keystrokes. Use mouse with AppleWorks. No more pathnames! Just select from a menu. Buy MacroWorks for AppleWorks versions 1.0 - 1.3. Buy Super MacroWorks for AppleWorks version 2.0.

MacroWorks (List 34.95) **$29.00**
Super MacroWorks (List 49.95) ... **$39.00**

256K RAMS 150ns. 5 year warranty. Set of 8 **$39**

VIP Professional Lotus 1-2-3 Workalike. For IIe & IIc (List $249) **$169**
For IIGS (List $299) **$199**

RamWorks™ That's right, RamWorks not RamWorks II. RamWorks is the memory card that started the revolution. RamWorks can expand to 512K on the main board and up to 1 meg with an optional 512K piggyback and can accept Applied Engineering's new RGB option. A 512K RamWorks gives AppleWorks a 360K desktop. Comes with Applied Engineering's newest software. With 512K **$139**

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10. All shipments are insured by us.

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Texas, Hawaii and Alaska 1-214-484-5464

Orders only call 1-800-327-7234
Questions and Customer Service call 1-214-484-5464
Texas residents add 6¼% sales tax

Prices subject to change without notice

IIGS UPDATE

BY GARY B. LITTLE

DESK ACCESSORIES FOR THE APPLE IIGS

Utility programs that coexist with applications: what they are and how to use them

The desk accessory is one of the many brilliant concepts Apple Computer, Inc., has popularized. Desk accessories first made their debut with the Macintosh and officially graduated to the Apple II family when the IIGS came out in September 1986.

As most of you probably know, a desk accessory is a program (usually a small utility) that peacefully coexists with a primary application. If the application is properly designed, you can call up a desk accessory at any time, use it, return to the application, and then continue using the application as if it had never been interrupted. You don't have to save work before activating the accessory or restart the application from the beginning after leaving the accessory.

Popular desk accessories are those that provide useful features that applications do not usually offer directly: a calculator, notepad, clock, and appointment calendar, for example.

Let's take a close look at what's happening with desk accessories on the Apple IIGS. But first, a little history:

Desk accessories for the IIe and IIc did not appear until late 1985; the first were Pinpoint Desktop Accessories and Jeeves. The main reason for the lateness of their introduction was the complexity of shoehorning foreign code into an unmanaged memory space (unmanaged in the sense that a program cannot reserve a memory space for its own private use); devising a method for passing control from applications to the desk accessory was also difficult.

In the past two years, a few programmers have concocted other schemes for making applications work smoothly with accessory-like programs. MouseDesk (now called Apple II DeskTop), for example, comes with several private accessories: Calculator, Date, Puzzle, Show Textfile, and Sort Directory. (These are sometimes called DeskTop Desk Accessories or DDAs.) Unfortunately, the structure of these types of files has not been published, so independent programmers can't create their own DDAs for the Apple II DeskTop.

MouseWrite, a word-processing program, also functions with desk-accessory programs, but in a different way. It can pass control to any binary program less than 16.5K in size or to any system program that doesn't use auxiliary memory. When the accessory program ends, MouseWrite reverts to its previous state. Since the accessories have no special structure, they are as easy to write as normal programs.

Clearly, the desk-accessory situation for the Apple II family before

PHOTOGRAPHY BY TOM McAFEE

Figure 1: You access a Classic Desk Accessory (CDA) by pressing Control, open-apple, and Esc. This clears the screen and brings up a menu with the names of the desk accessories available to you.

Figure 2 (above): You call up a New Desk Accessory (NDA) such as this Clock/Calendar by using a pull-down menu under the apple symbol.

Figure 3 (right): NDAs create separate windows on the screen that may coexist with the application's window.

Figure 4: SoftSwitch is a CDA that lets you switch control among three ProDOS or DOS 3.3 applications.

Figure 5 (below): Meltdown, an NDA entry in CompuServe's DAcathalon contest, serves no other purpose but to "melt down" the image on your screen.

the release of the GS was far from perfect. Simply put, there was no standard method by which any application could access any accessory; today it seems that Pinpoint's scheme (clearly documented in the Pinpoint Toolkit) has garnered enough support to qualify as a de facto standard, however.

With the release of the IIGS came official desk-accessory standards. Apple has defined mechanisms for adding two types of desk accessories to the GS and has established simple rules that application programmers can follow to ensure they will work effectively.

Whereas a CDA takes complete control of the IIGS until you exit from it, an NDA shares the screen with the application.

The IIGS Desk Accessories

The two types of official desk accessories the IIGS can handle are called classic desk accessories (CDAs) and new desk accessories (NDAs). (The names obviously parallel those Coca-Cola used after the "new Coke" debacle—possibly a subtle jab from John Sculley, former president of PepsiCo.) As we will see below, CDAs are accessible from any application, but NDAs work only with applications that take advantage of the IIGS's Macintosh-like desktop environment. In this article, I will explain how to install and use these types of accessories on the IIGS.

CDAs

You access classic desk accessories by pressing three keys on the keyboard simultaneously: Control, open-apple, and Esc. Doing so causes an interrupt signal that the GS reacts to by clearing the text screen and displaying a menu containing the names of up to 14 installed CDAs (see figure 1). You can activate a specific CDA by using the arrow keys to highlight the CDA name and then pressing Return. Two standard CDAs always appear in the menu: the Control Panel (for configuring the system hardware and setting user preferences) and the Alternate Display Mode switch (when the switch is on, you can run programs that use the GS's secondary text screen).

You can access the CDA menu any time 65816 interrupts are enabled, which is most of the time. (The only programs that seem to disable interrupts for long are certain copy-protected programs, so avoid using them.) Thus, CDAs work with almost any IIGS application, including traditional IIe-style applications and the new-style applications that work in the desktop environment.

NDAs

New Desk Accessories, on the other hand, are available only to applications such as Paintworks Plus and GraphicWriter that use the desktop environment, which depends on the IIGS tool sets. This restriction applies because you activate an NDA by pulling down the apple menu in a desktop menu bar (this menu has a multicolored apple icon instead of a title) and selecting the NDA's name. By convention, this menu appears on the far left side of the menu bar (see figure 2).

NDAs are more difficult than CDAs for an application to work with because they are more intimately connected to the application. Whereas a CDA takes complete control of the GS until you exit from it, an NDA shares the screen with the application and cannot work properly without a helping hand from the application. Most NDAs, for example, create windows that may coexist on the screen with windows created by the application; the application must be ready for this situation and let you switch between accessory and application windows (see figure 3).

Installing CDAs

Most CDAs you come across are stored in files that have a file-type code of $B9. (The file-type code appears when you display the files on a disk with the ProDOS 8 CATALOG command.) To install the CDAs, you place the files in the /MY.DISK/SYSTEM/DESK.ACCS/ subdirectory of your ProDOS 16 boot volume (where MY.DISK is the name of the disk volume). You can use file-copying programs such as Copy II Plus, Filer, System Utilities, or Apple II DeskTop to do so. When you boot the volume, ProDOS 16 automatically installs the CDAs it finds in this subdirectory.

Some CDAs are stored inside permanent initialization files (SoftSwitch is an example; see below). These files have a file-type code of $B6 and a catalog mnemonic of STR (for "start-up"). These types of files have to go into the /MY.DISK/SYSTEM/SYSTEM.SETUP/ subdirectory. When ProDOS 16 boots, it executes any $B6 file it finds in the subdirectory, so a typical desk-accessory $B6 file contains the active code for the accessory and the code necessary to install it in the CDA menu.

Diversified Software Research's two CDAs, Diversi-Cache and Diversi-Copy, are nonstandard. They are stored in standard ProDOS 8 binary files, and to install them, you simply BRUN the files from Applesoft BASIC. Be careful when you use these, because they may cause problems if you subsequently try to boot a ProDOS 16 disk.

Writing desk accessories for the IIGS is not that difficult if you have some programming experience.

The maximum number of CDAs that you can install (including the standard Control Panel and Alternate Display Mode accessories) is 14. Current versions of ProDOS 16 will actually crash if you attempt to install more, although I'm sure this bug will be eradicated soon. Until Apple develops a scrollable CDA menu, you can use a public-domain desk accessory called Master to increase the number of CDAs effectively available to you. Master takes up one position in the CDA menu, but it controls up to 100 other CDAs; when you select it, it displays a list of the CDAs it controls and allows you to choose the one you want to use.

Be aware that all CDAs except Control Panel and Alternate Display Mode disappear from the CDA menu when you press Control/open-apple/Reset. (The only exceptions are the Diversi-Cache and Diversi-Hack accessories from

Diversified Software Research; they survive because of some "unauthorized" patching that may cause trouble with future versions of the operating system.) The only way to reinstall the CDAs is to reboot ProDOS 16, but doing so takes far too long for even the most patient user, especially when many accessories have to be loaded. The moral: Avoid resetting the system when you're using CDAs.

Installing NDAs

New Desk Accessory files have a file-type code of $B8. Only NDA files that you have placed in the /MY.DISK/SYSTEM/DESK.ACCS/ subdirectory on the boot disk (by copying them just as you would a CDA) are added to the apple menu when a desktop application installs the available NDAs.

The number of NDAs an application can live with is limited by the vertical resolution of the super-high-resolution graphics screen. Any menu, including the apple menu in which the accessory names appear, has room for only 16 items, so that's the limit. Most applications use the first item in the apple menu for "About . . . " copyright information, however, so you are usually restricted to 15 NDAs.

Commercial Desk Accessories

As I write this article, only a handful of commercial desk accessories are available for the IIGS. More will undoubtedly appear as programmers begin to master the programming techniques for creating them.

The most complex accessory to date is SoftSwitch from Roger Wagner Publishing. This CDA lets you switch control among three ProDOS 8 or DOS 3.3 applications you've previously loaded into memory. You can also use it to copy any image that appears on the screen into your favorite graphics program so you can manipulate it further or print it (see figure 4).

The Diversi-Cache CDA from Diversified Software Research is for allocating an area of memory for use as an Apple 3.5 Drive cache. When the computer first reads a disk block from disk, it saves it in the cache so that the next time it's needed, it doesn't have to access the disk. Thus, disk operations speed up dramatically.

Included free of charge with Diversi-Cache is another CDA called

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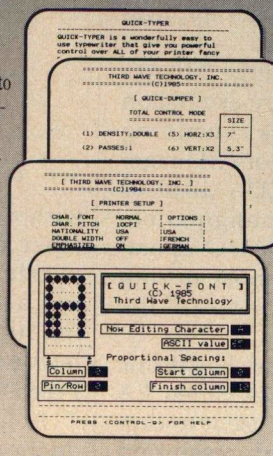

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CIRCLE 144 ON READER SERVICE CARD

DAcathalon Contest Entries

ACCESSORY	TYPE	AUTHOR	DESCRIPTION
CALENDAR	CDA	Glen Bredon	Displays the calendar for any month of any year
CLOCK/CALENDAR	NDA	Gary Little	Displays the current time, date, and day of week
DISK INFO	CDA	Gary Little	Displays the names and capacities of all disks in the system and the names of all ProDOS 16 prefixes
DUMP FILE	CDA	Glen Bredon	Displays the contents of any file on disk in hexadecimal form
HEX/DEC/BIN CONVERTER	CDA	Bill Ruff	Converts numbers between decimal, binary, and hexadecimal systems
MASTER	CDA	Glen Bredon	Allows you to increase the maximum number of CDAs available to the system
MELTDOWN	NDA	Jason Harper	Causes the screen display to drip like an ice-cream cone in the summer sun
MOUSE LOCATOR	NDA	Gary Little	Displays the current mouse position relative to the coordinate origin of the active window
MOUSETEXT REMOVER	CDA	Jason Harper	Removes unintentional MouseText characters from old programs that don't handle MouseText properly
NOTEPAD	CDA	Glen Bredon	Lets you type short notes and save them to disk
PAINTWORKS FIX	CDA	Jason Harper	Restores the default color palette in case it's damaged while you're running Paintworks Plus
RATIONAL CALCULATOR	CDA	Glen Bredon	An RPN calculator
TOOL SHED	CDA	Jason Harper	Displays the name, version number, and status of each GS tool set
TYPE FILE	CDA	Glen Bredon	Displays the contents of any text file or sends it to the printer
TYPEWRITER	CDA	Glen Bredon	Lets you enter a line of text (with editing) and then sends it to the printer when you press Return
VISIBELL	CDA	Jason Harper	Causes the screen to flash when a program tries to beep the speaker with a Control-G

Diversi-Hack. It appeals primarily to programmers because with it you can enter the GS "system monitor"—the part of the operating system located in ROM—at any time. It also lets you print the current text-screen display of the application you've interrupted.

When you buy Orange Micro's RamPak 4GS memory-expansion card, you also get a disk containing a CDA called the Memory Management Utilities. This CDA displays the current memory configuration, gives statistics on disk I/O operations, performs memory-testing diagnostics, and sets the size of the RamPak disk cache.

DeluxePaint II from Electronic Arts comes with a CDA called EA Screen Saver. You can use it to capture any super-high-resolution screen image and save it to disk in a format suitable for loading into DeluxePaint.

Less action is apparent on the NDA front, at least for the moment. By the time you read this article, however, Simple Software's DeskPak product should be available. DeskPak comes with several—dare I say it?—simple NDAs, including two different clocks (one with a sweeping second hand, the other digital), a text-file reader, a puzzle, a calculator, an ASCII chart, and a set of file tools for performing such tasks as renaming and deleting files on disk.

First place in DAcathalon went to Meltdown.

Free Desk Accessories

A few months after the introduction of the IIGS, Neil Shapiro, Chief System Operator of MAUG (the Apple special-interest group on CompuServe), had a great idea. To encourage the development of useful, public-domain desk accessories for the IIGS, he organized a contest called—what else?—the DAcathalon. Like any legitimate contest, it had prizes: First prize was $250 in IIGS products or one month's free connect time on MAUG; second prize was $150 in products or one week's free connect time; and third prize was $50 in products or one weekend's free connect time.

Since programmers are quick to respond to financial incentives such as these, several developers, myself included, started pumping out the first accessories the general public had ever seen, apart from Control Panel and Alternate Display Mode. (Apple had previously released a few other accessories, but to developers only.)

At the DAcathalon entry deadline, 3 NDAs and 13 CDAs had been submitted, some conventional (a notepad, calculator, and clock/calendar) and some highly unconventional (a screen "melter"—see

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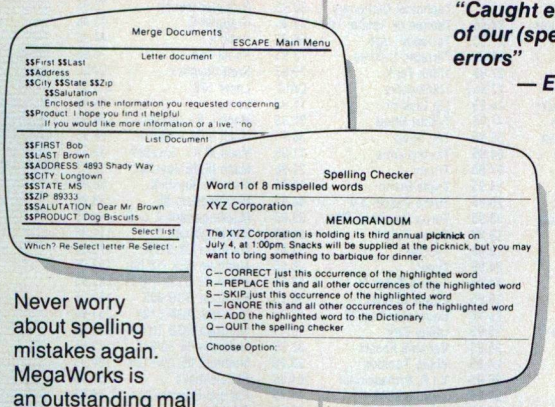

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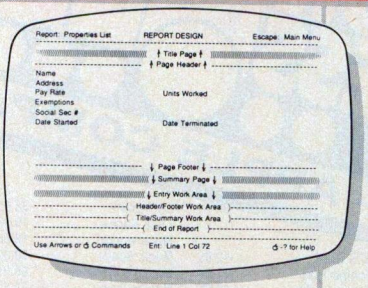

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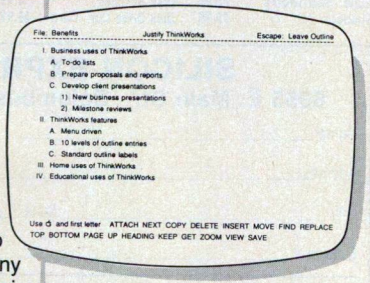

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figure 5). Our accompanying table gives a complete list of the accessories entered. Another goal of the contest—to teach programmers how to develop desk accessories—was achieved because every contest entrant submitted commented source-code listings for public perusal.

The winners of the contest were announced in late June. First place went to Meltdown, a desk accessory designed just for fun by Jason Harper. I received the second-place prize for Mouse Locator, an NDA I wrote to help developers determine the mouse position on the screen. Third place went to Glen Bredon's Master CDA, an accessory that allows you to increase the maximum number of CDAs you can have available. The winners and all the other entries are available for you to download from CompuServe.

To get the DAcathalon entries, you must download them from the MAUG data libraries on CompuServe. Once you sign onto CompuServe, type GO APPLE at any prompt to enter MAUG; then start browsing through data libraries 4 and 6 to locate the accessories. Contact a MAUG system operator for specific information on how to access a data library and how to download the files. Many of the accessories are beginning to drift to other information services, such as GEnie and Delphi, so look for them there if you're not yet a CompuServe subscriber.

Developing CDAs and NDAs

Writing desk accessories for the GS is not that difficult, at least if you have some programming experience. The preferred programming language is 65816 assembly language (because the files you create will be smaller and will load faster), but you can also use TML Pascal or the Apple Programmer's Workshop version of C.

When writing an accessory, you must follow certain Apple Computer programming rules. They are documented in the *Apple IIGS Toolbox Reference*, available from APDA (Apple Programmers' and Developers' Association) and, soon, in standard book form from the Addison-Wesley Publishing Company. Other convenient sources of the rules are chapter 24 of *Apple IIGS Technical Reference* (1987, Os-

borne/McGraw-Hill) by Michael Fischer, and chapter 9 of my own *Exploring the Apple IIGS* (1987, Addison-Wesley). *Exploring the Apple IIGS* also includes the complete source-code listing for a clock/calendar NDA.

Begin Accessorizing

You should now have no problem installing and using any New Desk Accessory or Classic Desk Accessory you might encounter, which means you're all set to begin experimenting with the hundreds of accessories we'll undoubtedly see in the months and years to come. Have fun, and don't forget to monitor the information services for those free public-domain accessories. +

Gary Little's latest book, Exploring the Apple IIGS, *was published earlier this year by Addison-Wesley.*

VITAL STATISTICS

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Requires: Apple IIGS, 512K RAM, one 3.5-inch disk drive. ProDOS 16; not copy-protected; mouse optional.

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(313) 553-9460
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Requires: Apple IIGS, 256K RAM, one 5¼-inch disk drive. ProDOS 8; not copy-protected; does not work with mouse.

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SoftSwitch
Roger Wagner Publishing, Inc.
1050 Pioneer Way, Suite "P"
El Cajon, CA 92020
(619) 442-0522
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CIRCLE 338 ON READER SERVICE CARD

Direct Memory Access

HOW IT WORKS, HOW IT AFFECTS IIGS MEMORY-EXPANSION CARDS, AND WHAT YOU CAN DO ABOUT IT

In the May 1987 issue of *A+*, I urged all Apple IIGS users to buy memory-expansion cards for their systems (see "Thanks for the Memory," page 22). Without extra memory, you just can't run the GS-specific, ProDOS 16 applications that are available, so I'm sure many of you read that article carefully and have now purchased memory cards.

In that same issue, Roberta Schwartz and Michael Callery reviewed AST Research's VisionPlus video digitizer. This interesting device lets you transfer black-and-white or color images from a video camera to the IIGS so you can display and manipulate them on the super-hi-res graphics screen.

Ironically, we now know that some IIGS memory cards do not work quite right with the VisionPlus because of design defects in the memory cards. The defects sometimes cause the VisionPlus control program that digitizes color images or 640 × 200-mode black-and-white images to fail. The module of the program that displays black-and-white images on the 320 × 200-mode screen does work, however.

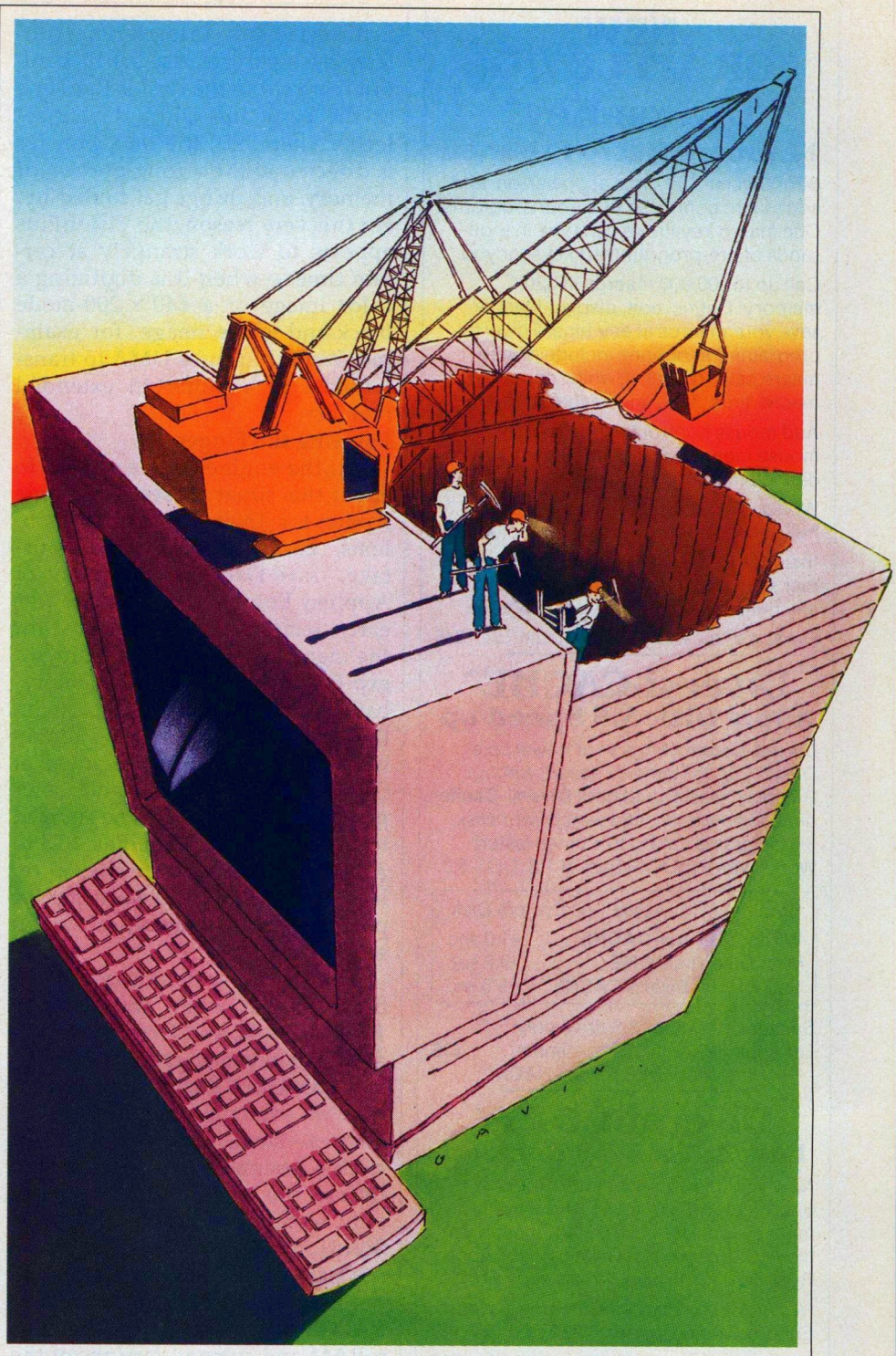
Before I explain why these problems occur, keep in mind that two IIGS memory cards work just fine with the VisionPlus: AST's RamStakPlus and Apple's IIGS Memory Expansion Card, both of which hold a maximum of one megabyte of memory (arranged as four rows of eight 256K × 1-bit RAM chips). The ones that can cause problems are Applied Engineering's GS RAM and GS RAM Plus; Orange Micro's RamPak 4GS; and, possibly, OctoRAM from MDIdeas, all of which can have more than four rows of 256K × 1- (8 chips/row), 1024K × 1- (8 chips/row), or 256K × 4- (2 chips/row) bit RAM chips.

If you allocate part of the card's memory as a RAMdisk, however, the GS RAM, GS RAM Plus, and the OctoRAM will work perfectly with the VisionPlus digitizer. The same trick works with the RamPak 4GS, but only if the card is fully populated to four megabytes and you use all its memory as a RAMdisk (see below).

DMA

The GS RAM and RamPak 4GS don't work properly with the VisionPlus because VisionPlus uses a technique called direct memory access (DMA) to transfer video data from the camera to extended memory. (Extended memory is the memory on the RAM-expansion card.)

DMA is an operational mode in which a device effectively disables the 65816 microprocessor so that the device can access memory without going through the 65816. This technique leads to a dramatic increase in the speed of memory operations, so it's a great way to efficiently transfer large amounts of data to memory.



Other common DMA devices for the Apple II are most Z80 coprocessor cards and the Corvus Omninet controller card (which also work with other members of the II family). These devices do work with IIGS memory cards, however, because they were designed for older Apple II computers and don't attempt to access extended memory. We may come to see audio digitizers and SCSI controller cards using the DMA technique, though, that will make use of extended memory.

Why DMA Causes Problems

The address space for the 65816 is 16 megabytes in size, meaning that 24 bits are necessary to define an address uniquely. When the 65816 is in control, it places the lower 16 bits of an address on the address bus; the upper 8 bits go onto the data bus, which, at the proper time, acts as an extension of the address bus. The number defined by the upper 8 bits of a 24-bit address is called the bank number, because it tells the system which 64K memory bank is being selected. (The 65816 organizes memory as a series of 256 64K banks.)

During a DMA operation, however, the bank number does not appear on the data bus; instead, it goes into a DMA-bank latch register. The lower 16 bits of the address still appear on the address bus.

Circuitry on the IIGS motherboard continuously monitors address requests and sends a decode signal to a IIGS memory card in the memory-expansion slot. The card can use this signal to select the particular memory location being accessed. The decode signal takes into account whether the 65816 is in control or whether a DMA operation is taking place—when a DMA device is in control, the system uses the bank information stored in the DMA-bank latch; otherwise, it uses the bank address the 65816 puts on the data bus.

The GS's address-decode signal is the only one needed by cards that have no more than four rows of 256K × 1-, 256K × 4-, or 1024K × 1-bit RAM chips. If the card has more than 4 rows (GS RAM and GS RAM Plus each have 6 rows, RamPak 4GS has 16 rows, and OctoRAM has 8 rows), the card must include additional decoding circuitry for determining when RAM in the extra rows is being accessed. For this reason, DMA devices run into problems. These types of memory cards all look to the data bus for the bank portion of the address, but it is not there if a DMA operation is taking place. Theoretically, the cards should grab the bank information from the DMA-bank latch if a DMA operation is taking place, but they can't because the IIGS doesn't send information about the DMA status to the memory-expansion slot.

As a result, when a DMA operation involving extended memory takes place, the memory card uses

ILLUSTRATION BY KERRY GAVIN

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incorrect bank information (unless, by luck, the last 65816 bank number sent to the card is the same as the bank the DMA device selects). Therefore, the data transfer is directed to the wrong portion of memory, and things get fouled up. For this very reason, the VisionPlus appears to work strangely at certain times—when it is digitizing a color image or a 640 × 200-mode black-and-white image, for example, VisionPlus uses DMA to transfer data to a buffer in extended memory.

Pointing the Finger

All the engineers I've spoken to about this situation seem to blame Apple for their RAM-card problems. "Basically, Apple made a mistake," says Dan Pote, president of Applied Engineering. Apparently, early technical specifications for the memory-expansion slot did not explicitly state that the memory-bank information would not be on the data bus during DMA operations. Mike Luna, an engineer at Orange Micro, agrees and complains that even though he showed test versions of the RamPak 4GS to Apple engineers before the GS release, he received "no warnings [of potential DMA difficulties], whatsoever."

The DMA problem was also difficult to test when the RamPak 4GS, GS RAM, and OctoRAM were designed because, at that time, no available DMA devices took advantage of extended memory. DMA devices—such as coprocessor cards—designed for older Apple IIs use the first 128K of memory only, so they work properly.

Solutions

Despite the DMA problems, you probably won't have to scrap your RAM-card investment. The OctoRAM and current versions of the GS RAM and GS RAM Plus work just fine with installations of four rows (or fewer) of memory chips. (With older versions of the GS RAM and GS RAM Plus, all four rows have to be populated. If you have one of these older cards, Applied Engineering will provide a low-cost upgrade if you provide proof of purchase of the GS RAM and the VisionPlus.)

It turns out that the OctoRAM seems to work even with more than four rows filled because of the particular technique it uses to select whether the upper or lower four rows of memory are being accessed and because the card happens always to select the proper bank when the VisionPlus program is running. This is fortuitous, and problems might occur with other DMA devices or if the VisionPlus software is modified.

If you have more than four rows of memory chips, you can bypass DMA problems altogether by allocating the extra rows of memory for use as a RAMdisk by employing the Control Panel RAM Disk command. (The RAMdisk always uses memory at the top end of the expansion-memory space.) If you have six rows of 256K × 1 chips, for example, set the minimum and maximum RAMdisk size to 512K. When you do so and a DMA operation takes place, the decoding circuitry on the card never accidentally selects a bank in a row past the core four rows, because the last valid bank number the card sees always defines a bank in the lower four rows. Thus the card works correctly for DMA operations.

Orange Micro's RamPak 4GS card has more serious problems because it uses 256K × 4-bit RAM chips. According to Mike Luna, the card's designer, the card must be fully populated (with 4 megabytes) and all the memory must be allocated as a RAMdisk before it can work with DMA devices. Obviously, this approach is not satisfactory, because you lose the extra program space you need to run ProDOS 16 applications. Orange Micro is currently planning an interim solution for its customers. I suspect it will eventually redesign the card to use four rows of 1024K × 1-bit RAM chips.

Don't Panic

I hope I've made it clear that you shouldn't panic if your card doesn't work perfectly with DMA devices such as the VisionPlus. Simply keep the RAMdisk allocation trick in mind and remember that glitches have either already been remedied by the manufacturer of your card or are about to be remedied. ✚

Gary Little's latest book, Exploring the Apple IIGS, *was recently published by Addison-Wesley. It is a thorough programmers' guide to the IIGS.*

BY ROBERTA SCHWARTZ AND MICHAEL CALLERY

The definitive paint program for the Apple IIGS

DELUXEPAINT II

Electronic Arts' DeluxePaint II has arrived. This incredibly full-featured, powerful program will never be praised for its ease of use, but after one hour with it, our comment was, "Now we know why we bought the Apple IIGS." If there's any function you've been wishing for in a paint program, you will probably find it here.

DeluxePaint II's tools include built-in brushes, dotted freehand, continuous freehand, straight line, curve, fill, airbush, unfilled/filled rectangle, unfilled/filled circle, unfilled/filled ellipse, unfilled/filled polygon, text, grid, symmetry, magnify, zoom, undo, clear, and the brush selector. The brush selector is the star of the show.

Make a Brush and Go

Many Apple II paint programs allow you to create brushes, but DeluxePaint II takes this capability to the extreme. Anything you put on the screen can become a brush; a brush can even be a full picture. The area you define as a brush can be rectangular or irregularly shaped. You can paint with it; mirror it; and apply a wide variety of special functions including shearing (sloping), full 360° rotation, and flipping. We guarantee you'll be awed when you see the results of bending horizontally or vertically. The perspective feature is astonishing too—you can rotate any brush in three-dimensional space with true one-point perspective. By the way, you can save your custom brushes to disk and use them to transfer pieces of images from one picture to another.

There's More

DeluxePaint II allows you to turn off the toolbox and menus and work on the full screen. Bravo! Almost all commands are available from the keyboard, so, once you've learned the numerous keyboard commands (and we do mean numerous), you won't have to tolerate palettes, toolsets, and menus covering part of your picture as you work. In addition, the program provides two pages to work with.

DeluxePaint II's extensive palette manipulation is impressive. Your brush can be used to color, smooth, shade, smear, and so on. If your brush has a different palette than the current image, you can tell DeluxePaint to calculate the closest matches between brush and picture. You can create a stencil by defining palette colors that cannot be painted over. Color cycling is a snap, and four independent palette ranges are provided. The list goes on and on.

We plan to give you a complete review of this exciting program in an upcoming issue, but we wanted you to know, as soon as possible, that, without a doubt, DeluxePaint II is the best paint program ever to appear for an Apple II. ✚

VITAL STATISTICS

DELUXEPAINT II

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RAM: *768K*
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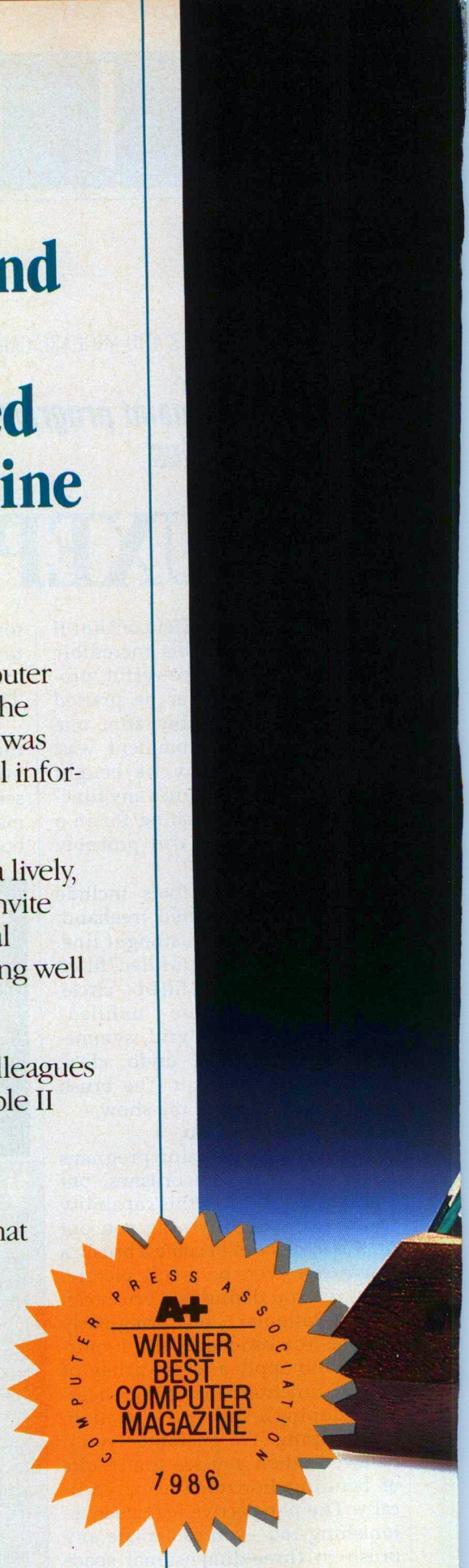

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IIGS SOUND *BY ROLAND GUSTAFSSON*

OSCILLOSCOPE

A wealth of waveforms awaits you with this BASIC program.

A real-time oscilloscope on the Apple IIGS? Yes! This machine-language program reads the Ensoniq sample register and displays the data on the screen at a rate of about 70 sweeps per second at the fastest sample rate and about 13 sweeps per second at the slowest sample rate. You can feed sound into the Ensoniq sample register by building a crude sound-input device such as the one we described in the April 1987 issue of *A+* (see "Sound-Input Device," next page) or simply plug in an MDIdeas Sound Digitizer board.

This project enables you to view sound waveforms from your CD player, cassette-tape player, stereo, or musical keyboard. Single musical instruments make pure waveforms and are the most interesting to watch. Try whistling or humming a steady tone. FUN!

Program Description

The accompanying BASIC program pokes the values in the data statements into the computer's memory. These values make up the machine-language program that emulates an oscilloscope. The call in line 40 actually starts the program. If you have a SuperSonic stereo card in a slot other than 2, don't forget to change the SS variable in line 10 to the correct slot number. The program adds the machine-language values together as it pokes the values into memory. If the total doesn't match the total in line 1290, the program lets you know there is an error in the data statements, which saves you a lot of grief—and *A+* a lot of phone calls. See figure 1 (next page) for oscilloscope special commands.

```
5       REM Roland's Oscilloscope 1/22/87
10      SA = 4096:LE = 393:SS = 2: REM (SS is SuperSonic Digitizer  slot)
20      FOR A = SA TO SA + LE - 1: READ B: POKE A,B:C = C + B: NEXT
30      READ A: IF A <  > C THEN  PRINT "Data statement error!": END
40      POKE SA + 2,SS: CALL SA: END
1000    DATA  128,2,2,1,32,68,17,32,234,16,32,40,17,162
1010    DATA  0,32,117,16,232,172,3,16,136,208,253,173
1020    DATA  97,192,13,98,192,48,248,173,0,192,16,233
1030    DATA  44,16,192,201,155,240,34,201,160,208,9,77
1040    DATA  118,16,141,118,16,76,4,16,172,3,16,201,136
1050    DATA  240,47,201,138,240,43,201,149,240,28,201
1060    DATA  139,240,24,128,27,44,81,192,44,86,192,96
1070    DATA  169,48,44,48,192,168,136,208,253,58,208
1080    DATA  246,76,15,16,136,48,238,240,236,140,3,16
1090    DATA  76,15,16,200,48,227,16,245,169,17,24,48
1100    DATA  56,188,0,22,185,0,18,125,0,21,133,58,185
1110    DATA  0,19,133,59,189,0,20,73,255,50,58,146,58
1120    DATA  173,61,192,141,144,192,157,0,22,168,185
1130    DATA  0,18,125,0,21,133,58,185,0,19,133,59,189
1140    DATA  0,20,18,58,146,58,96,188,0,22,189,0,18,121
1150    DATA  0,21,133,58,189,0,19,133,59,185,0,20,73
1160    DATA  255,50,58,146,58,173,61,192,141,144,192
1170    DATA  157,0,22,168,189,0,18,121,0,21,133,58,189
1180    DATA  0,19,133,59,185,0,20,18,58,146,58,96,160
1190    DATA  0,152,162,32,142,244,16,153,0,32,200,208
1200    DATA  250,238,244,16,202,208,244,160,36,189,0
1210    DATA  18,133,58,189,0,19,133,59,169,16,145,58
1220    DATA  232,208,239,160,3,169,127,153,204,61,136
1230    DATA  16,250,44,84,192,44,87,192,44,82,192,44
1240    DATA  80,192,96,173,2,16,10,10,10,10,9,128,141
1250    DATA  151,16,141,207,16,175,202,0,225,141,60,192
1260    DATA  169,226,141,62,192,96,100,0,100,1,169,191
1270    DATA  133,2,169,32,133,230,165,2,32,17,244,166
1280    DATA  0,165,38,157,0,18,165,39,157,0,19,24,165
1290    DATA  1,105,192,133,1,144,2,198,2,230,0,208,224
1300    DATA  162,0,160,0,169,1,157,0,20,72,152,157,0
1310    DATA  21,104,10,16,3,169,1,200,232,208,238,96
1320    DATA  40023
```

Figure 1: Oscilloscope special commands

Open-apple key (upgraded IIe)
Closed-apple key (upgraded IIe)
Command key (IIGS)
Freeze current waveform while key is pressed

Space bar
Switches between vertical or horizontal sweep

Down-arrow, left-arrow
Decrease the sample rate

Up-arrow, right-arrow
Increase the sample rate

ESC
Exits from the program and returns you to BASIC

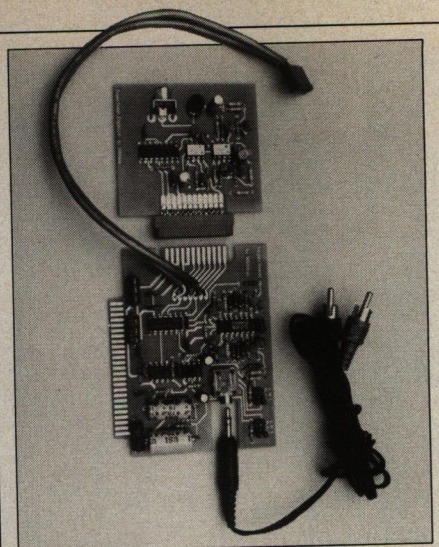
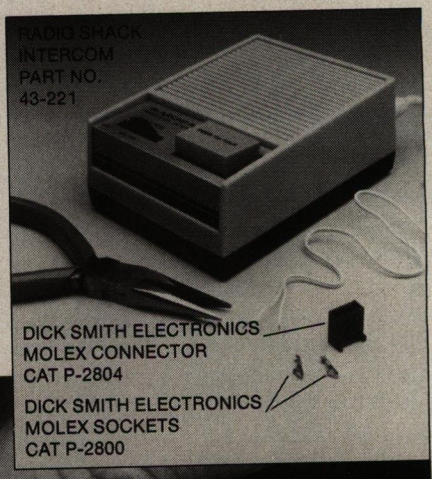


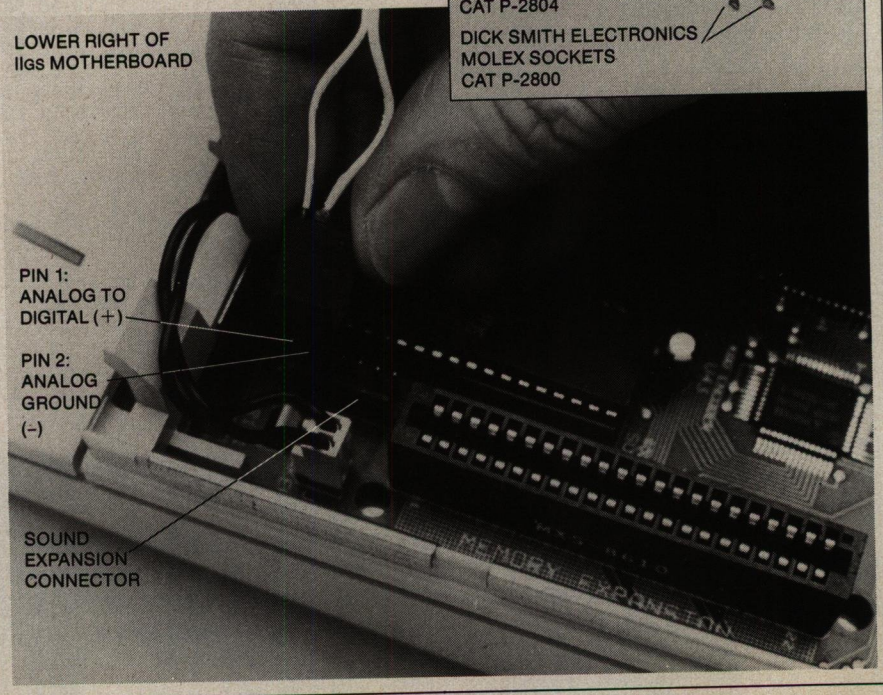
Figure 2: The SuperSonic stereo card with the Digitizer card from MDIdeas lets you input any standard audio sounds for about $100.

SOUND-INPUT DEVICE

As we described in the April 1987 issue of *A+* (page 93), you can build your own crude sound-input device for about $15. Just remove one of the connectors on the intercom cable. Then solder a molex socket onto each wire and place the sockets into the molex connector. Make sure you plug into the IIGS sound-expansion connector, so that the wires connect to pins 1 and 2 (see photo below).

WARNING: The IIGS's polarity can be reversed if the wires to pins 1 and 2 are incorrect. To restore correct polarity to the IIGS, remove the memory card, reboot the system, turn the computer off, and replace the memory card.





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BY KEN LANDIS

A multifunction card for beginners and old-timers alike

SLOT-BUSTER II

One of the most common phobias of Apple computer owners is a fear of not having enough slots. Since the Apple II was first introduced, countless companies have struggled to find a cure for this dreaded condition. One of the latest, and best, solutions is the Slot-Buster II, from RC Systems, Inc.

Slot-Buster II (SB II), which is the successor to Slot-Buster I, is a multifunction Apple II Plus, IIe, and IIGS peripheral card. Slot-Buster works under ProDOS, DOS 3.3, or CP/M, and you can program it with Integer BASIC, Applesoft, or Pascal. The product requires only one hardware slot and does not make you use so-called phantom slots, as do many other multifunction cards—a major advantage.

The features you can add to the SB II are a Centronics-compatible parallel port, an RS-232 serial port, a speech and sound synthesizer, and a clock. You can also obtain a BSR X-10 controller and a modem port, but I won't review those here. Each of these add-on features comes as a plug-in ROM that you add to the main Slot-Buster board.

Every function on the SB II has an independent section of the built-in buffer, which allows simultaneous use of all the ports. You can program the parallel and serial ports individually, with different operating characteristics to accommodate any mix of printers, modems, plotters, and the like.

One concern voiced by most Apple II owners who have heard of the Slot-Buster is about whether it will drag their machines down; i.e., will it require so much of my Apple's processing power and memory that I won't be able to do anything else? The answer is no. The SB II has a Z80 microprocessor and its own memory. The card's functions are totally self-contained

and require no Apple-resident software drivers.

Installing the Slot-Buster is slightly more complicated than with the average card. To accommodate the speech synthesizer, you have to connect the Apple speaker, as well as a game I/O connection that allows you to use the open- and closed-apple keys, to the product. Neither of these are major operations, but they do require a set of nimble fingers. You can install the SB II in any slot except 0 on a II Plus or 3 on a IIe or IIGS.

The printer ports use standard Apple conventions, such as PR#1 when the SB II is in slot 1. Because it requires no unique commands, it also works perfectly with commercial software. In fact, the SB II emulates the Apple Parallel Interface (in the parallel mode) and the Super Serial Card (in the serial mode) to any program. The SB II's standard print buffers can hold up to 8000 characters at a time, and the SB II allocates the 8000 characters in the buffers between the ports automatically.

For example, if you had 2000 characters in the serial print buffer, 6000 would be left for the parallel buffer and the synthesizer. The on-board Z80 acts as a traffic cop, controlling what goes where in the buffers.

As you know, your Apple is much faster than your printer. When printing, the Apple often sits idle, waiting for the printer to catch up. Buffering "catches" data from your Apple as fast as it can send it and then releases it to the printer when it's ready to accept it. The result is that you get more system throughput.

Once you have used the buffering feature of SB II, you won't believe that you once sat and waited for your Apple when your printer was running. If 8000 characters is not enough, you can increase the SB II's buffers to up to 64,000 characters. For most users, this range of

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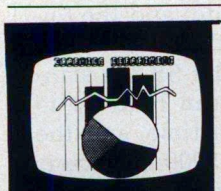

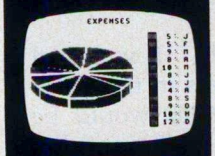

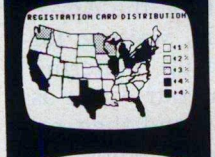

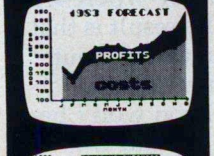

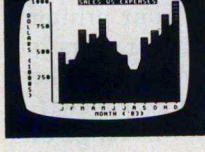

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buffer sizes should work fine.

With the SB II, you retain complete control over the information in the buffers. Some products send buffered information directly to the printer as soon as they get it, regardless of what you do—with the single exception of shutting the Apple off. Rather than making you shut your Apple down, which erases any information in the computer's memory, the SB II allows you to send commands to the buffer to clear them.

A useful feature of the SB II is that it lets you set "switches," or configuration settings, from software instead of having you use the traditional hardware switches you'll find on most cards. Using a program that comes on the utility disk, you can reconfigure the SB II at any time. The program uses a Macintosh-like interface and is simple to use. These settings are the "power-up," or default settings. You can temporarily override them at any time by using simple commands that you send to the slots by using the appropriate PR# command. Only the enabled port can be changed by this on-the-fly method.

The Speech Synthesizer

The speech synthesizer "looks and feels" like a printer. You get sound generation by sending strings, or lines of text, to the synthesizer as though it were a printer. A built-in processor converts the text to speech that can be translated character by character or word by word.

The synthesizer uses a set of rules to interpret speech. You can augment these rules with up to 1000 more user-defined rules for special applications, or you can teach the synthesizer to speak a foreign language. Included on the SB II utility disk is a set of Spanish pronunciation rules.

The heart of the SB II's speech synthesizer is a speech generator that produces the 256 phonemes, or sounds, that comprise human speech. By connecting phonemes, it can imitate the human voice and thus language.

As with any speech synthesizer, certain words are mispronounced, based on the pronunciation rules the synthesizer uses. To correct these mispronunciations, you must spell words phonetically, hyphen-

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ate them (especially words such as *baseball*), teach the synthesizer how they should be pronounced, or spell them out directly with phonemes. It takes some time, but the results can be remarkable.

A fascinating SB II utility allows automatic use of the speech synthesizer with AppleWorks. With this utility installed, the synthesizer echoes all keyboard entries on a key-by-key or word-by-word basis. Other options available for the synthesizer are SCAT, or screen articulator, which gives speech-synthesis capabilities, as well as screen-review capabilities to most unprotected software, and the AppleWorks Companion, which is a version of SCAT tailored to AppleWorks. These facilities have tremendous applications for the sight-impaired.

Timepiece

The SB II's clock has all the features you expect to find in a standard Apple clock, such as a built-in battery, utilities for reading or writing to the clock, and a ProDOS driver for automatic date- and time-stamping of files. A unique additional feature leverages off the SB II's printer ports. Any document that goes to a printer through the SB II with the statement *Time has the time printed on it (the SB II's clock uses A.M./P.M. notation vs. a 24-hour clock). If you put *Date into the document, the date will print out with full names of months, with a comma after the day. This handy feature works with word-processing, spreadsheet, and database programs.

VITAL STATISTICS

SLOT-BUSTER

Start with the Slot-Buster to add multiple functions to your Apple: a parallel and/or serial port, a speech synthesizer, a clock, a BSR X-10 controller, and more. All this without using more than one slot.

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Other Utilities

The other utilities that come with the SB II are a machine-language routine that allows Applesoft to read colons and commas without causing errors, a speech-synthesizer tutorial, rule compilers for the synthesizer, three short games that work with the synthesizer, an SB II diagnostic, an ImageWriter installation program, a mouse installation program, and a graphics-dump program.

The SB II comes with an excellent set of documentation. All installation instructions, commands, and utility programs are covered and well described.

For new Apple owners, the Slot-Buster II is the perfect card to buy. For longer-term Apple users who have slot-population problems or who want to experiment with speech synthesis or get a clock or a print buffer, the Slot-Buster II is a great way to build capability at a reasonable price. ✚

Ken Landis has been working with and writing about Apples since 1979. His first Apple II is a prized family heirloom.

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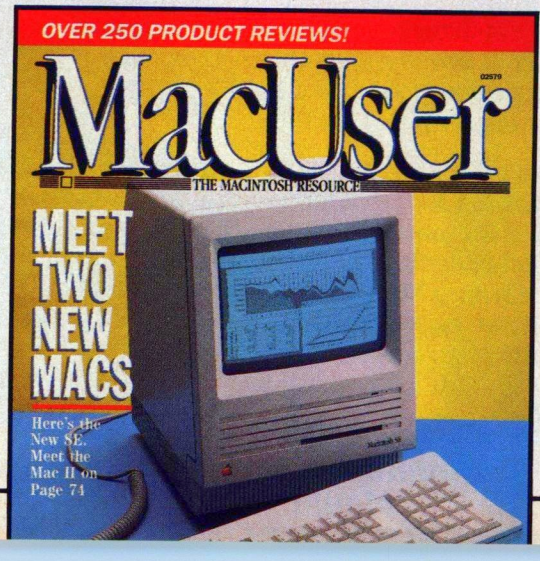

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Teacher (lesson ideas)	■ ■	■ ■	■ ■
Group contest	■ ■	■ ■	■ ■

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CIRCLE 182 ON READER SERVICE CARD

BY MARY JANSIEWICZ

Home accounting software to help you stay even

ON BALANCE

Personal money management is, by definition, an individualized process. It's difficult to find one program to "fit all," but Brøderbund Software's On Balance may be that one program.

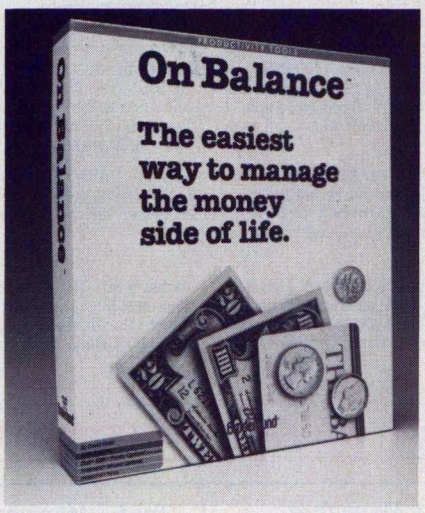
On Balance is a new home accounting program that provides maximum flexibility in setting up accounts and budgets, making it easy to adapt to your individual record-keeping needs. The program also lets you keep several different sets of records. You can keep data on separate diskettes for different family members, or for a business or organization.

Brøderbund's product is primarily for managing personal finances. It keeps track of checking and savings accounts and credit cards and loans, as well as newer kinds of transactions (automatic-teller withdrawals/transfers and electronic fund transfers). Yet it can also handle record keeping for a small business or organization.

You can also keep track of investments—both cash and in kind (by determining market value)—and use this information along with liabilities, income, and expenses to get the program to provide net-worth and net-income statements.

The blurb in the program's packaging claims, "If you know how to write a check, you know how to use On Balance," and at its simplest level, that's true. You enter information on the screen register just as in a checkbook register: date, check number or deposit, payee, a memo, and an amount.

Taking advantage of more sophisticated features in On Balance, such as its double-entry bookkeeping, is not hard. A short but adequate section in the documentation defines common accounting terms and explains how they occur within the program. Since data entry is so simple, you can get started



recording transactions and refer to that section of the documentation as necessary, until you get a feel for this kind of accounting.

The program is easy to learn because most of the routines and conventions are familiar to Apple II users. It incorporates popular features of other programs such as pull-down menus, dialog boxes, pop-up goodies, and shortcut commands.

One outstanding feature of On Balance is that it lets you perform tasks in more than one way. In setting up accounts, for instance, you can begin by defining asset, liability, income, and expense accounts and establishing budget amounts for each. Or you can begin putting in transactions right away and decide what to name an account when you reach the column on the register requesting that information. Later on, you can enter budget amounts for these accounts.

Though the manual gives examples of accounts you might create, the program has no template (as in some other home accounting programs) from which to start.

It's easy to make changes in data you've already entered. You can correct errors on the current or previous monthly registers and alter account or budget information. Again, you have several ways to excise errors. You can backspace by using the Delete key to get rid of text; you can use either apple key and the D key to erase the character marked by the cursor; or you can erase an entire transaction, account, memo, or notepad page with an apple key and the Delete key.

Some of the most useful features are part of a group of "goodies." Among them is a calculator that pops up to overlay the screen on which you're working. Another is a pop-up list of all account names you've created so far to help jog your memory.

Other useful goodies are the

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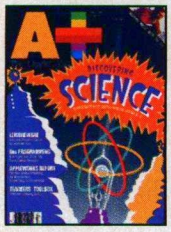

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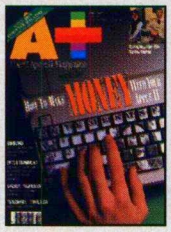

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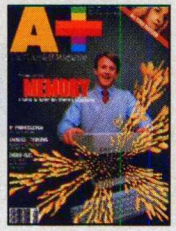

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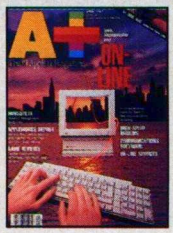

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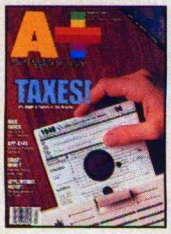

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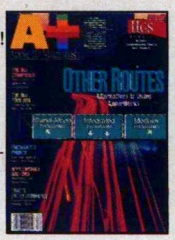

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notepad and the program's screen-dump capability. Using just an apple key and H, you can get a hard copy of whatever is on the screen—handy when you need just a limited amount of information, rather than the more complete printed listings and reports the program can also generate.

You can view or print reports in a variety of formats, some with graphs. The graphs look good on the screen but lose some detail when you print them. The program is designed to work with most printers, so no adjustments should be necessary.

The program has features you'll find in many other home accounting programs: reconciliation with bank statements, check-printing, and split entries. The split-entry display works well with this register format. It saves time to have all splits listed on one screen instead of having them displayed one at a time.

On Balance also has some pluses you won't find on most other home accounting programs, such as the ability to enter recurring transactions with just a few keystrokes, and the expandable memo space on the register (which lets you give more detail about a transaction).

The documentation is well-organized and concise. The reference section is alphabetized, complete, and clearly written, with one exception. I had to call Brøderbund's technical-support people to find out how to clear the calculator's memory.

On Balance doesn't have tax-planning capabilities, as some more expensive home accounting programs do, and it doesn't work directly with a tax program, as Home Accountant from Haba Systems/Arrays, Inc., does. You can flag, sort, and print tax-related transactions, however.

The program comes with a second disk containing an export utility for use with AppleWorks. AppleWorks owners can use On Balance in conjunction with the AppleWorks spreadsheet module for more sophisticated financial planning.

Of the three home accounting programs I've worked with (On Balance; Personal Finance Manager from Software Dimensions, Inc.; and The Home Accountant from Continental Software Company), On Balance is the most satisfactory. In addition to being the easiest, it's the fastest by far—in searches, in calculations, and in getting from one part of the program to another. It's well worth the investment. ✚

Mary Jansiewicz is a Baltimore-area free-lance writer who specializes in food writing.

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MOUSE: *optional*
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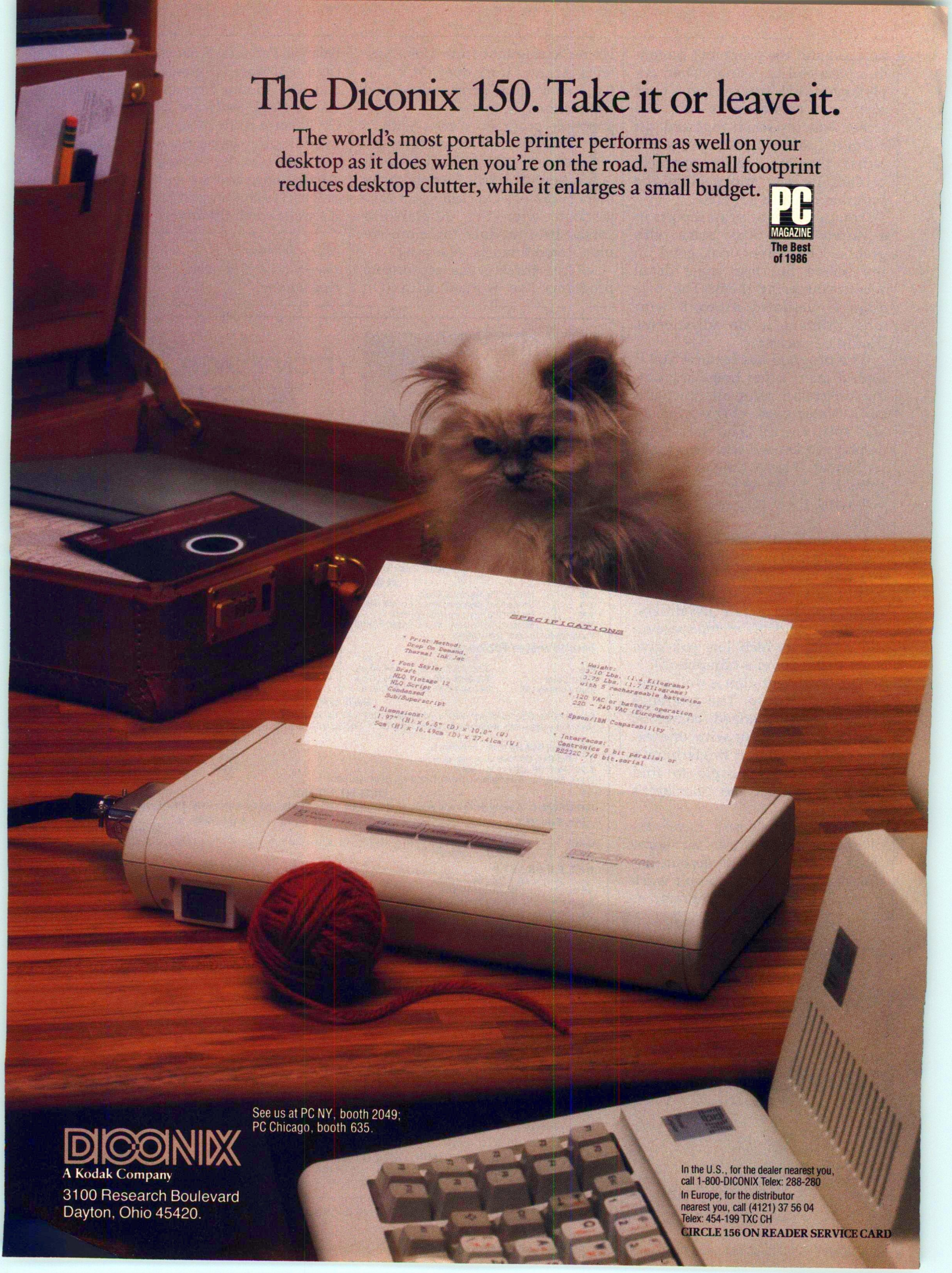
CIRCLE 136 ON READER SERVICE CARD



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CIRCLE 156 ON READER SERVICE CARD

FEATURE REPORT
USING @LOOKUP
TIP FOLDER
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SHORT REPORT
MORE ON MULTICOLUMN TEXT

A+ APPLEWORKS REPORT

FEATURE REPORT *BY CHARLES RUBIN*

USING THE @LOOKUP FUNCTION

A simple function in the AppleWorks spreadsheet module that can help you manage tabular information

Tables of numbers are common devices for organizing and storing information. Often when we have information containing two or more related numbers in several sets, or records, we use tables to simplify storing and retrieving the data. The federal government uses tables to show how different income levels correspond to different tax rates. Insurance companies use actuarial tables to show the relationship between age and life expectancy, or between age and insurance premiums. Suppliers of all kinds use tables to show how discounts on merchandise correspond to order amounts, and shipping companies use tables to show the relationship between the sizes of loads and their freight charges.

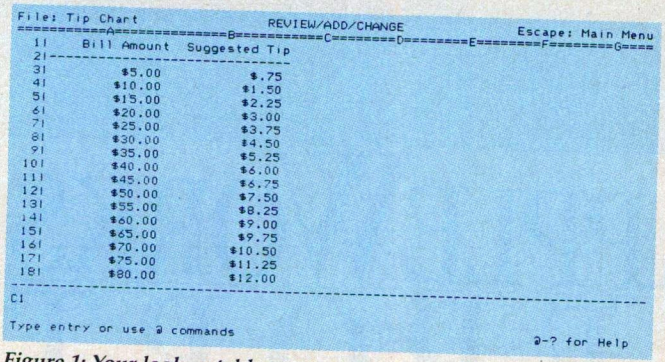
The @LOOKUP function in the AppleWorks spreadsheet module can help you manage tabular information in your business and/or personal life. @LOOKUP does what its name implies: It looks up numbers in tables. Whenever you have a set of records in which one number corresponds to another for each record, you can use the @LOOKUP function to enter one number and have the spreadsheet program find its corresponding value for you.

How @LOOKUP Does It

The @LOOKUP function always works with tables containing two adjacent columns or rows, in which the top row or left-hand column contains the scan numbers (the numbers you want the spreadsheet program to use as guides to finding information), and the bottom row or right-hand column contains the corresponding numbers (the numbers you want located). A simple example is a pocket "tip chart" some people use to determine how large a tip to leave at a restaurant: A small portion of such a chart might look like the table in figure 1 (next page).

As you can see, the left-hand column in the table contains various bill amounts. These are the scan numbers—the numbers you scan through to match the amount of your bill. The right-hand column contains the corresponding tip amount (assuming a 15% tip) for bills of different sizes. By simply locating the amount of your bill in column A, you can check the adjacent column to see how much your tip should be.

The @LOOKUP function in AppleWorks is for searching tables like this one, finding the amount in the left-hand column (or top



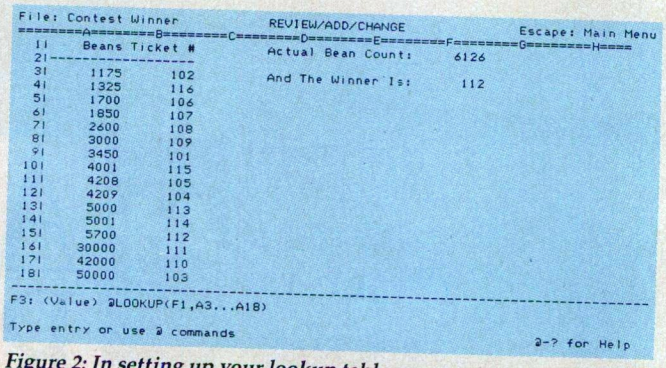
File: Tip Chart REVIEW/ADD/CHANGE Escape: Main Menu

	Bill Amount	Suggested Tip
1		
2		
3	$5.00	$.75
4	$10.00	$1.50
5	$15.00	$2.25
6	$20.00	$3.00
7	$25.00	$3.75
8	$30.00	$4.50
9	$35.00	$5.25
10	$40.00	$6.00
11	$45.00	$6.75
12	$50.00	$7.50
13	$55.00	$8.25
14	$60.00	$9.00
15	$65.00	$9.75
16	$70.00	$10.50
17	$75.00	$11.25
18	$80.00	$12.00

C1

Type entry or use @ commands @-? for Help

Figure 1: Your lookup table must contain two adjacent rows or columns, such as this simple "tip chart."



File: Contest Winner REVIEW/ADD/CHANGE Escape: Main Menu

	Beans	Ticket #
1		
2		
3	1175	102
4	1325	116
5	1700	106
6	1850	107
7	2600	108
8	3000	109
9	3450	101
10	4001	115
11	4208	105
12	4209	104
13	5000	113
14	5001	114
15	5700	112
16	30000	111
17	42000	110
18	50000	103

Actual Bean Count: 6126

And The Winner Is: 112

F3: (Value) @LOOKUP(F1,A3...A18)

Type entry or use @ commands @-? for Help

Figure 2: In setting up your lookup table you must arrange the scan column in ascending numerical order.

row), and returning the corresponding value in the right-hand column (or bottom row). Lookup tables always serve the same purpose: They link numbers that are easy to determine with other numbers that are difficult to determine. You look up the number that's easy to determine, and the table instantly shows you the corresponding number that would otherwise be hard to determine.

Here's the format of @LOOKUP formulas in AppleWorks:

@LOOKUP(value,range).

After you type the function name @LOOKUP and an open parenthesis, you type the value you want the spreadsheet to match as it searches the row or column of scan numbers in the lookup table. The range is the actual location of the row containing the scan numbers. If you wanted AppleWorks to determine the tip amount for a bill of $15 in the table in figure 1, you would type:

@LOOKUP(15,A3 . . . A18).

It tells AppleWorks to take the value 15, search the scan numbers in cells A3–A18 until it finds the largest number equal to or less than 15, and then return the value in the cell directly to the right.

@LOOKUP Rules

The first prerequisite for using @LOOKUP in a spreadsheet is the lookup table itself. You must enter all the numbers in both columns of the lookup table, and the lookup table must be located in the same spreadsheet file as the @LOOKUP formula. Entering all the table values by hand is tedious, but the idea is that you have to enter the numbers only once, and then you can use the table over and over again to locate information quickly. Also, you may have already entered the information in another AppleWorks file. If you've already entered part numbers and prices for an inventory table in a database file, for example, you can use AppleWorks' data-interchange features to move the information into a spreadsheet file.

In building the actual lookup table, you have to keep a few things in mind. First of all, the table must contain either two adjacent rows or two adjacent columns. The example in figure 1 is a vertical, or columnar, table. Either way, the rows or columns must be adjacent—there can't be a blank row or column between them. The second requirement is that the scan numbers (the numbers in the top row or left-hand column) must be in ascending order. When the @LOOKUP function scans a table, it looks for a number that is equal to or less than the value you entered in the formula. Having numbers in the scan row or column that aren't in ascending order can cause the function to locate the wrong value.

@LOOKUP does what its name implies: it looks up numbers in tables.

The rows or columns in the table must contain values in every cell: You can't have blank cells or cells containing labels in either the scan row or the row of corresponding values. If @LOOKUP encounters a blank cell or a label when it searches the scan row, or the corresponding cell contains a label or is blank, the formula returns the message ERROR.

Depending on the type of information you store in a lookup table, you may occasionally enter a search value that is less than all the values in the scan row or is greater than all the values in the scan row or column. If the search value is less than all the values in the scan row or column, the formula returns the message NA, for *not available*. If the search value is greater than any value in the scan row or column, it returns the value that corresponds to the largest value in the scan row, which is the last value in a column or the rightmost value in a row. (Incidentally, page 165 of the *Using AppleWorks* manual that comes with AppleWorks Version 2.0 incorrectly states that if the search value is less than any value in the scan row or column, the formula returns the lowest value in the row or column. In fact, the formula returns NA in such cases.)

Finally, even though the basic formula above indicates that you must enter a value as the first item inside the parentheses, remember that the AppleWorks spreadsheet program treats cell references as values, too, so it can be a cell reference. Let's look at a couple examples of @LOOKUP in action.

After The Bean Count

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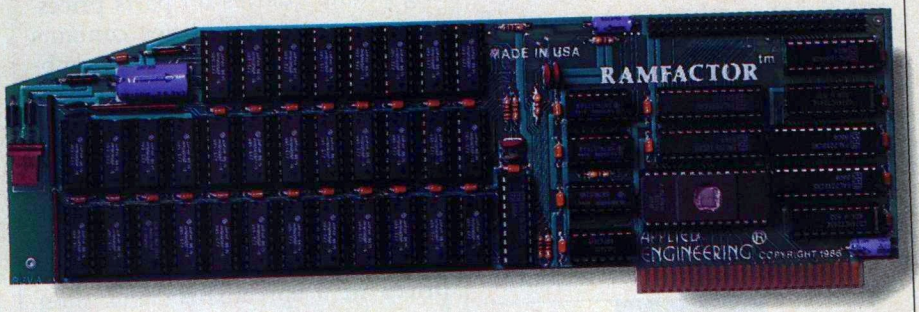
With RamFactor, you'll be able to instantly add another 256K, 512K, or a full 1 MEG on the main board and an expansion connector can address an additional 16 MEG of memory for possible future expansion. Since virtually all software is automatically compatible with RamFactor, you'll immediately be able to load programs into RamFactor for instantaneous access to information. You'll also be able to store more data for larger word processing documents, bigger data bases, and expanded spreadsheets. And with the battery back-up option, you can switch on your Apple and your favorite software will be up and running in less than 1 second!



Very Compatible

All the leading software is already compatible with RamFactor. Programs like AppleWorks, Pinpoint, BPI, Managing Your Money, Dollars and Sense, SuperCalc 3A, PFS, MouseWrite, MouseDesk, MouseCalc, Sensible Speller, Applewriter IIe, Business Works, ReportWorks, Catalyst 3.0 and more. And RamFactor is fully ProDos, DOS 3.3, Pascal 1.3 and CP/M compatible. In fact, no other slot 1-7 memory card is more compatible with commercial software.

AppleWorks Power

There are other slot 1-7 cards that give AppleWorks a larger desktop, but that's the end of their story. But RamFactor is the only slot 1-7 card that increases AppleWorks internal memory limits, increasing the maximum number of records in the database and lines permitted in the word processor, and RamFactor is the only standard slot card that will automatically load all of AppleWorks into RAM dramatically increasing speed and eliminating the time required to access the program disk, it will even display the time and date on the AppleWorks screen with any ProDos clock. RamFactor will automatically segment large files so they can be saved on 5¼", 3½", and hard disks. All this performance is available on the Apple II+, IIe, Franklin, or Laser 128 when used with an 80 column display. RamFactor, no other standard slot card comes close to enhancing AppleWorks so much.

The "Instant On" Apple.

With the RamCharger battery backup option, RamFactor will retain programs and data during power failures or even when you turn your computer off. And because RamFactor plugs into slots 1-7, it's the only memory card that can cold boot an Apple without using slow floppy or hard disks. An available "Y" cable allows one RamCharger to power two RamFactors.

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With RamFactor, you can organize memory into multiple work areas and switch between them. Each work area can contain different programs and even different operating systems. Now you can switch from one program to another or even switch from AppleWorks to DOS 3.3 to CP/M to Pascal to ProDos in under a second. And with our battery back-up option, you can have permanent storage for up to 20 years.

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- Automatically recognized by ProDos, DOS 3.3, Pascal, and standard CP/M
- Built-in RamDrive™ software (a true RAM disk not disk caching)
- Systems are directly bootable from RamFactor if desired
- Built-in self diagnostic software
- Automatic expansion with AppleWorks 1.3 or 2.0
- Allows Apple II+ and IIe to run your AppleWorks without buying any additional software
- Accelerates AppleWorks
- Displays time and date on the AppleWorks screen with any ProDos clock
- Fits any I/O slot except slot 3
- Fully socketed and user upgradeable
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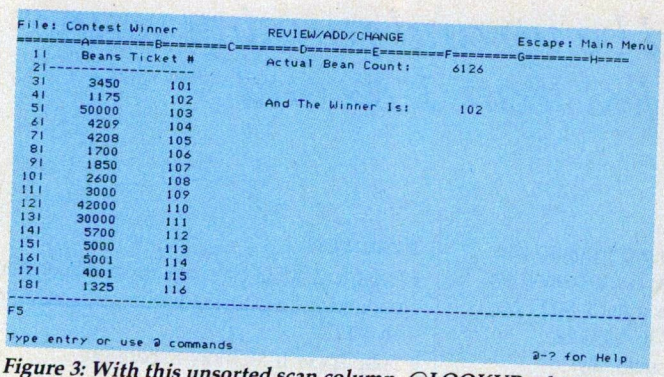


File: Contest Winner REVIEW/ADD/CHANGE Escape: Main Menu

	Beans	Ticket #
1		
2		
3	3450	101
4	1175	102
5	50000	103
6	4209	104
7	4208	105
8	1700	106
9	1850	107
10	2600	108
11	3000	109
12	42000	110
13	30000	111
14	5700	112
15	5000	113
16	5001	114
17	4001	115
18	1325	116

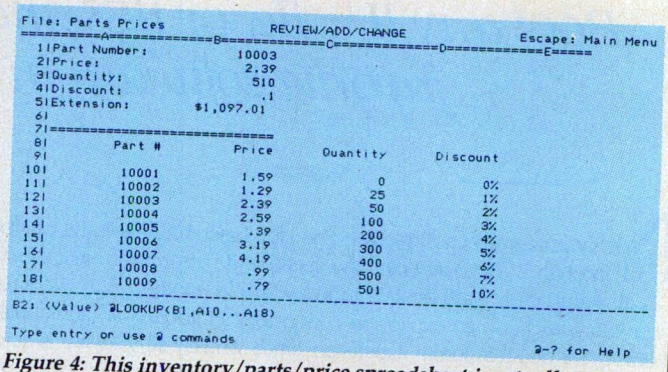
Actual Bean Count: 6126

And The Winner Is: 102

F5

Type entry or use @ commands @-? for Help

Figure 3: With this unsorted scan column, @LOOKUP selects the wrong winner.



File: Parts Prices REVIEW/ADD/CHANGE Escape: Main Menu

1 Part Number: 10003
2 Price: 2.39
3 Quantity: 510
4 Discount: .1
5 Extension: $1,097.01

	Part #	Price	Quantity	Discount
9				
10	10001	1.59	0	0%
11	10002	1.29	25	1%
12	10003	2.39	50	2%
13	10004	2.59	100	3%
14	10005	.39	200	4%
15	10006	3.19	300	5%
16	10007	4.19	400	6%
17	10008	.99	500	7%
18	10009	.79	501	10%

B2: (Value) @LOOKUP(B1,A10..A18)

Type entry or use @ commands @-? for Help

Figure 4: This inventory/parts/price spreadsheet is actually two lookup tables side by side

ging entries for the jelly-bean-counting contest and determining the winner. Your group has sold more than 500 tickets, each with its own guess about the number of jelly beans in the five-gallon bottle, and your job will be to quickly determine the best guess once the contest is over. This challenge is a good one for @LOOKUP. You have two corresponding sets of numbers—a ticket number and an estimated number of jelly beans—and you will have a specific bean count to match against the entries.

As the tickets sell, you record the guesses in a spreadsheet like the one in figure 2. This sample table contains guesses only through row 18, but you get the idea. Column A, the scan column, contains the jelly-bean estimates for each ticket, and column B contains the ticket number that corresponds to each guess. Entering the guesses in ascending order, as the lookup table rules dictate, is no problem: Using AppleWorks' Arrange command (open-apple/A), you can simply sort all the rows in the spreadsheet on the contents of column A, in ascending order, once all the entries are in.

At the end of the contest, after all the jelly beans have been counted, you enter the bean count in cell F1. After that, you put @LOOKUP to work in cell F3 with the formula @LOOKUP(F1, A3 . . . A18). This formula tells the spreadsheet to take the value in cell F1 (6126), scan cells A3 through A18 for the largest number that is less than or equal to it, and then return the corresponding value from column B. As you can see, the spreadsheet program easily determines that ticket 112 is the winner. It takes some effort to enter all the guesses and ticket numbers, but it pays off when you instantly find the contest winner instead of having to sort through stacks of tickets.

This example also shows just how the @LOOKUP function scans and what can happen if you don't arrange the scan column in ascending numerical order. This table was originally ordered by the ticket numbers in column B, rather than from the smallest bean guess to the largest (see figure 3). When it scans a column, @LOOKUP begins at the top and moves down to the bottom. The first time it comes to a number that is larger than the matching value specified, it stops. In figure 3, the number 50000 (the guess on ticket 103) is the first value in the column that is larger than 6126, so @LOOKUP selects ticket 102 as the winner. Now you see why it's important to arrange the numbers in the scan row or column of a table in ascending order. In the AppleWorks spreadsheet module, arranging lookup tables as two columns lets you sort them—you can't sort data arranged in rows.

You can use AppleWorks to automate any table of numbers.

An Inventory Helper

The @LOOKUP function can also give you fast access to business information. Suppose you own a wholesale industrial-supply business, and you're constantly receiving phone queries on parts prices. Each of your parts lines contains more than 500 items, and thumbing through the pages of your catalog time after time gets tedious. Customers also ask frequently about the discounts they can get for buying certain quantities. With the @LOOKUP function, you can store all the parts' numbers and prices in a spreadsheet and then have AppleWorks locate specific prices for you. Let's have you put both of these tables into one spreadsheet.

At the top of the spreadsheet, create a reference area that lets you enter the part number and quantity requested and then see the price and discount rate. Since you're using a spreadsheet, you might as well add a row to show the extended price of an item after the price, quantity, and any discount are figured. To begin, you can enter just the labels in rows 1–5 of figure 4 and leave the formulas for later.

After skipping a couple of rows, you set up four columns for part number, price, quantity, and discount. What you actually have here is two lookup tables, side by side. The table on the left (columns A and B) matches part numbers with unit prices, and the table on the right matches order quantities with discount rates. This sample worksheet contains part numbers, prices, discount quantities, and discount rates only through row 18.

Once you've filled in the tabular

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data, you can enter the two lookup formulas to quickly locate information. Cell B1 is simply a blank that you'll use to enter the part number when somebody calls on the telephone for a price. In cell B2, you enter your first lookup formula: @LOOKUP(B1, A10 . . . A18). It tells the spreadsheet program to take the value in cell B1, find its match in column A, and then return the corresponding value from column B, which is the price.

Cell B3 is another blank you use to enter the quantity of the order. The lookup formula in cell B4 is @LOOKUP(B3,C10 . . . C18). It tells the spreadsheet to take the value in cell B3, search the quantity column (C) for a number less than or equal to it, and then return the corresponding discount from column D.

Note that neither of these lookup formulas will work properly unless actual values are entered in cells B1 and B3 for them to act upon. In the absence of values, the formulas return the message NA.

All that remains to complete the system is a simple arithmetic formula in cell B5 that multiplies the quantity by the price and then applies the discount. In this case, the formula ((B2*B3) – ((B2*B3)*B4)) multiplies the quantity by the price and then subtracts from that the quantity × the price × the discount to arrive at the final discounted quote.

There are many uses for the @LOOKUP function, and many of them don't involve the use of large tables such as those suggested here. In a salary-computation worksheet, a small lookup table can match salary ranges with withholding-tax rates. A commission worksheet can match commission rates with sales figures. With a little imagination, you can use AppleWorks to automate any table of numbers you must consult manually. ✚

BY STEVE HIGH

STARTUP DISK FOR FILE STORAGE

The 5¼-inch AppleWorks Startup disk has lots of space—about 100K. When I travel with a single-drive Apple IIc, I use a double-sided disk. I keep the AppleWorks program on one side, the Startup files on the other, and most of my data files on the Startup side as well. It's easier to flip a disk over than to hunt for another one.

SPACE BARS AND OTHER CHARACTERS

The AppleWorks Delete key deletes backwards. You can delete forward with the space bar and square (overstrike) cursor, which you select with the open-apple/E command. Actually, though, what you are doing is replacing the characters with invisible space characters. This subtle technical distinction normally doesn't matter, but

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AppleWorks database categories with nothing but space characters in them are not really blank and will not be found by a record selection looking for blank categories. In fact, a search won't find a data entry followed by a space character if you search for the entry alone.

Sometimes being aware of these invisible space characters can be helpful elsewhere. If you want to find (or replace) all the numbers in a word-processing document that begin with 2, you can use open-apple/F to search for all <space bar>2 combinations. Doing so causes AppleWorks to find numbers such as 215 while ignoring numbers such as 125 or 152.

PRINTING ENVELOPES

Printing envelopes with AppleWorks can be frustrating. I know for a fact that AppleWorks' author Bob Lissner keeps an IBM Selectric typewriter next to his five Apple computers for the express purpose of addressing envelopes.

But here's an envelope tip from Bill Peterson of Flint, Michigan. Peterson converts a business letter into an envelope addresser by placing the cursor on the letter's return address and using the printing option Print from cursor. The only extra commands he has to add are Left margin: 4.0 inches between the top of the letter (the date or his return address) and the address, and a Pause Here between the address and salutation. Then, AppleWorks prints the entire address with the proper indentation from the left edge of the envelope (4 inches) and then stops because of the Pause Here command.

A final alternative of mine is to create a word-processing document called Envelope. Set the left margin to 4.0 and the paper length to 3.7. Then enter the EK printer option three times and insert carriage returns so that each little caret symbol is on a line by itself. Put the envelope into the printer, and go for it. AppleWorks will pause at the beginning of each line and wait for you to enter the appropriate part of the address. Once you've typed a line of the address and pressed Return, the line will print, and the envelope will advance for the next line of the address.

AVOIDING SPACES IN ELLIPSES

Do you use ellipses (. . .) in quoted matter to indicate that part of a quotation is missing? Everything's fine until subsequent editing causes part of your ellipses to wrap around the margin. To prevent this problem, hold down the open-apple key while typing spaces between the periods, thus creating "sticky spaces" that word wrap can't break up.

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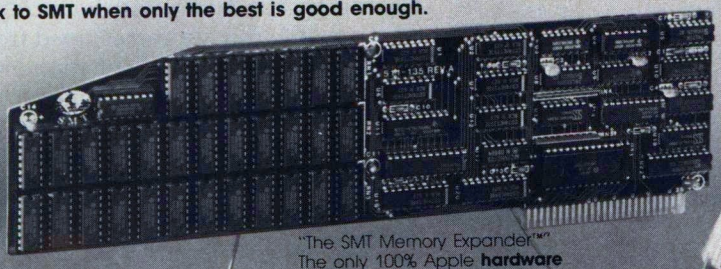

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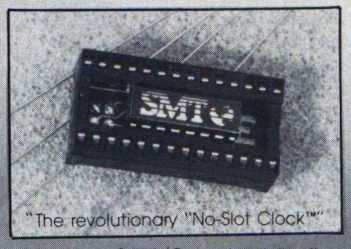

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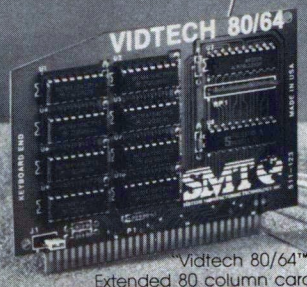

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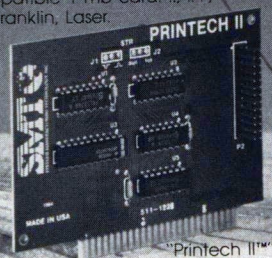

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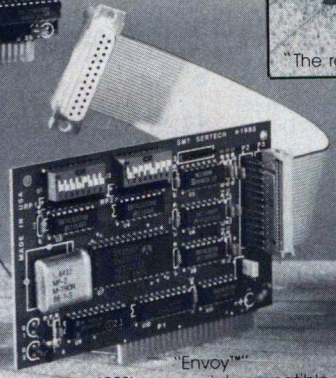

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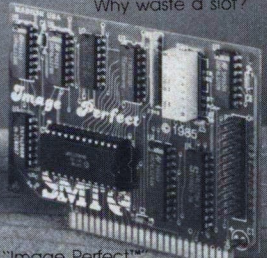

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CONFIGURING A 'DISK' PRINTER

You can always print an ASCII text file in AppleWorks by choosing that option from the Printer menu, but you can also print an ASCII file by choosing a "disk" printer, if one of your three available printer selections is so configured.

A disk printer is useful for sending text files over telephone lines, as described in the AppleWorks manual, but it also comes in handy for moving data between applications in AppleWorks. If, for instance, you want to send AppleWorks spreadsheet data to the word-processing module, to the database module, and back to the spreadsheet module again, you will need the disk printer to preserve the formatting of your columns and rows. A standard ASCII file is just an unformatted stream of text, but a disk-printed ASCII file maintains all the formatting of the original file.

To create a disk printer, choose the Apple Silentype printer configuration from the Add a Printer menu. Then, when AppleWorks asks you which slot the printer is connected to, choose the last selection, Print to disk or on another Apple. It's best to choose the Silentype printer configuration because the Silentype automatically adds carriage returns at the end of each line.

The word *disk* will appear in parentheses after whatever name you've given this printer, to remind you that you'll be printing to disk if you choose that option.

WHEN TO USE THE GREAT ESCAPE

You can back out of almost anything in AppleWorks by pressing the Escape key. If you get all the way back to the main menu, pressing Escape again will bounce you back into the file you escaped from. You'll notice this phenomenon when you hit Escape a bit too vigorously or too often. The upper right corner of the AppleWorks screen almost always tells you what will happen if you press Escape. In four places, the right-hand corner of the screen is blank. That's a clue; *don't* press Escape here, unless you want to enter it as part of a printer code.

You're not likely to find these places without directions, however, so don't worry about it. Escape is your best choice whenever you feel like you want to run away from something. +

Steve High is a public-relations professional whose clients include Applied Engineering and Bob Lissner, the author of AppleWorks.

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CIRCLE 160 ON READER SERVICE CARD

QUESTIONS FROM OUR READERS

AUTOMATIC DATE

Q. *We have an Apple IIe with RamWorks, Timemaster H.O., and TransWarp. Is there any way to print a date automatically in the AppleWorks word-processing module?*

Mrs. D.L. McClurg
Midland, TX

I have a problem handling dates in the standard American format (MM/DD/YY). It would be nice to make AppleWorks accept my notation (YYYY/MM/DD) without conversion in categories with DATE.

András Iklódy-Szabó
Caracas, Venezuela

A. If you want to disable the Time or Date feature in the AppleWorks database module, Mr. Iklódy-Szabó, rename your categories something that does not contain *time* or *date*, such as their non-English equivalents in another language. Doing so also disables the chronological sort, however. I must point out that most programs do a lot worse than convert dates and time to a standard format; they make *you* do the conversion before allowing you to type them in.

Mrs. McClurg, your Applied Engineering memory board and clock came with a patch to the AppleWorks database module that automatically reads the time or date into any category so named when you type @. This macro does not work in the word-processing module, however.

Pinpoint's KeyPlayer macro program can do what you want, however, as can Super MacroWorks from Beagle Bros. AutoWorks from The Software Touch and the plain-vanilla MacroWorks cannot read the clock. Also, you can create a new date macro once each day and use it over and over again.

GRADING SPREADSHEET

Q. *I am a teacher, and I have a problem using the spreadsheet module for grading. After summing the total grade and dividing to get a percentage, I would like to convert the percent score into a letter grade.*

Peter Hibbard
Toms River, NJ

A. In answer to your question and a similar one from Warren Williams, a teacher in El Cajon, California, I have to say I know of no AppleWorks spreadsheet function that returns a label (e.g., A, B, C, D, or F) when you enter a value (e.g., 95%).

Since you can do almost anything with AppleWorks if you don't mind spending the keystrokes, however, why not use a macro program to move the numbers into the word-processing module and then use the global search-and-replace function to produce letter grades?

Here's how. Insert a column between your percent grades and the students' names.

Copy the formula @int(a1/10)*10 down the column. It will round your percentages to the nearest 10 (60, 70, 80, 90). If you need it, the formula @if(a1<60, 50, A1) will change all grades of 59 or less to 50. Print this information to the Clipboard and copy it into a word-processing file. You can also transfer the information via an ASCII file if it is too big for your Clipboard.

Build a macro that searches for *90* and changes it to *A*. Use open-apple/1 to return to the top of the file, and follow a similar procedure with 80, 70, 60, and 50, changing them, respectively, to *B*, *C*, *D*, and *F*.

Moving this information back to your spreadsheet is awkward but at least plausible, if you use macros. See the answer to the next question.

MOVING SPREADSHEET NUMBER BLOCKS

Q. *I have been unable to move or copy a block of numbers from an AppleWorks spreadsheet to a selected location in another. Is it only possible to move and copy full rows?*

Ken Johnson
Marshalltown, IA

The Short Report in A+, March 1987, describes an unnecessarily complicated method for moving blocks of information. Spreadsheet (and database) information can more readily be sent to the word-processing module by printing to the Clipboard.

Paul Mattiuzzi
Sacramento, CA

A. There are lots of different ways to move data in AppleWorks, and whether they are necessary or not depends on what you want to do. You're right, Mr. Mattiuzzi, the Clipboard is the simplest way, but it doesn't always do the job. For example, in the answer to the above question, I left our teachers' spreadsheet information in the word-processing module after converting it to letter grades. The Clipboard won't take me back to the spreadsheet, nor does printing it as an ASCII file help, since the spreadsheet module can't read ASCII files.

You have to pass through the database module on the way back to the spreadsheet, and you will have better luck with a "disk" printer that emulates the Silentype printer than with the text (ASCII) file selection.

Once the grades are in a spreadsheet file, you can copy or move them to your original gradebook spreadsheet. You will find, however, as Mr. Thompson found, that copying a column of figures into an existing spreadsheet is no day at the park; AppleWorks inserts the new column above or below all your existing data. You have to copy it again within the original gradebook spreadsheet to put it in place next to your percentage grades.

Now, if you had to do this every semester, you would either set fire to AppleWorks or quit teaching. But once all of this tossing and turning has been immortalized in macros—perhaps closed-apple/L, for "letter grade,"—the whole procedure will execute in less time than it takes to go to the teachers' room and have a cup of coffee. ✚

SHORT REPORT

BY MARK E. SHIELDS

MORE ON MULTICOLUMN TEXT

We received several letters in response to the July installment of our "AppleWorks Report," in which Charles Rubin described a way to create multiple text columns. Here's the best of those letters, in which reader Mark Shields of Vincennes, Indiana, explains another way to achieve the same results.

I have spent many hours with Charles Rubin's book *AppleWorks* and have found it very helpful, but in the July "AppleWorks Report" on multicolumn formatting, I think he has pushed the data-interchange facilities of AppleWorks beyond practical limits.

Here's a simpler way to obtain a document as described in the article (two 3-inch columns with 1-inch margins and 0.5-inch gutter between the columns). At the top of your document, enter the options and change the top and bottom margins to 1 inch. Change the left margin to 0.6 inches and the right margin to 4.2 inches. These settings provide a single column of text approximately 3 inches wide. Now, while still at the top of this long column, type open-apple/K to calculate page breaks. Scroll to the first calculated page break, get into the options and enter a forced page break (NP).

Change the left margin to 4.2 inches and the right margin to 0.6 inches. Calculate page breaks again and, at the second calculated page break, force a page break with NP and change the margins back to their original settings (you can use open-apple/C, and copy them to the new location). Then continue through your document, alternating the margins settings. This procedure gives you alternating left and right columns. Go to the top of the document and enter option PE, pause each page, and print the document. The first-page left-hand column prints, and the printer pauses.

Put the same first page back into the printer, press the space bar to continue printing, and the right-hand column prints out. Repeat the procedure for subsequent pages.

Other advantages of this method: (1) you eliminate the file manipulation, text copying, and adding spacing for spaces lost in file transfer; (2) you can still edit the document after it is formatted; (3) you can justify or center the text in the column; (4) you can use different pitches without worrying about the column width; (5) you can selectively use underlining, boldface, superscripts, and subscripts; (6) you can use a custom font program without worrying about column width; and (7) if you set the top and bottom margins, AppleWorks will calculate your page breaks. +

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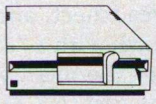

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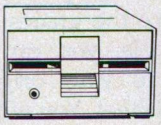

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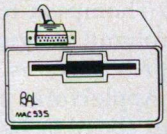

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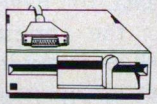

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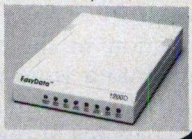

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CIRCLE 167 ON READER SERVICE CARD

BY DAVID D. THORNBURG

PROLOG AND EDUCATIONAL COMPUTING

Part II of a look into the Prolog language

Last month I described a programming language, Prolog, that has a lot of potential for educational computing. Unlike most languages with which you are probably familiar, Prolog lets you create programs that are descriptions of the problem domain rather than prescriptions for the step-by-step tasks that the computer must perform in order to produce a result.

With this shift in the burden of programming, you are free to explore topics in a more natural way with less focus on the mechanics of the computational process.

Because many introductory Prolog programs deal with topics that database programs handle well, some people have the mistaken notion that Prolog is just a convoluted database tool that performs functions better left to programs such as AppleWorks or PFS:File.

Microworld Construction Sets

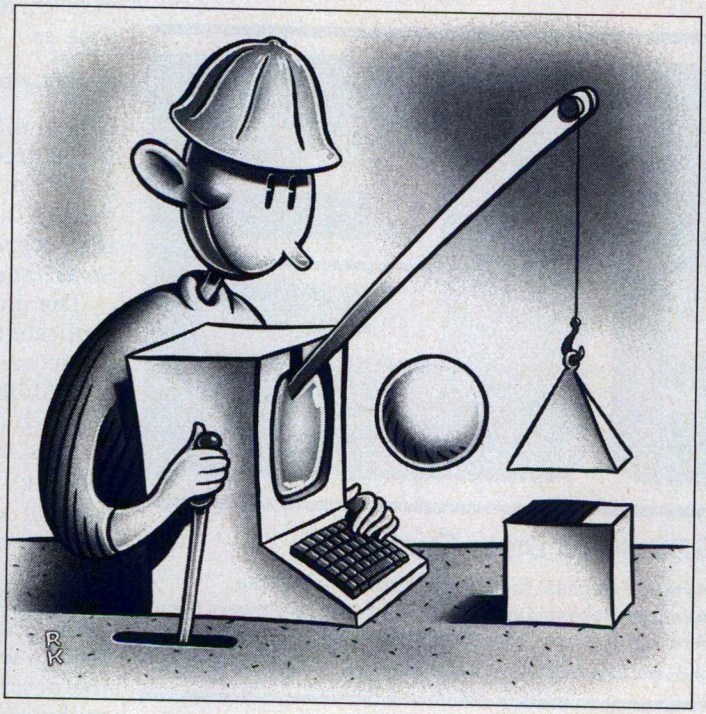
I prefer to think of Prolog as a universal microworld construction set that lets you construct, step-by-step, a model of a subject domain. By asking the computer to solve problems in this domain, you can check the accuracy of your assumptions in creating the domain and can modify the model as necessary.

Logo provides this capability in the field of geometry but is harder to use in this manner for other topics. Prolog, on the other hand, is well suited for explorations in domains ranging from mathematics to history and natural science. As a language of symbolic (as opposed to numeric) computation, Prolog can be used to build descriptive models of anything from electronic circuits to the Battle of Hastings. Best of all, the construction of models in Prolog requires no more skill than that required of students using Logo.

Spatial Reasoning

To illustrate a simple application of Prolog, I'm going to use a spatial-reasoning exercise of the kind you find in elementary-grade classrooms. A typical exercise has a child write an accurate description of a picture such as that in figure 1. For example, a child might write, "The circle is exactly left of the triangle, and the triangle is exactly above the square."

By modifying this task slightly, we can turn this exercise into an opportunity for students to build a computational model of this picture that can be extended to allow the computer to give accurate answers to such questions as "Is the square to the right of the circle?"



As in last month's column, we'll use the Edinburgh syntax. This syntax forms statements out of predicates (or "functors") followed by a list of arguments. So, for example, the English statement "John likes Mary" appears as

```
likes(john,mary).
```

Prolog reserves uppercase letters for variable names, hence john instead of John.

Starting Our Prolog Model

The first step is to have students provide the simplest description possible for the picture. For our example, they might enter the following facts:

```
exactly-left(circle,triangle).
exactly-above(triangle,square).
```

This two-statement description is

ILLUSTRATION BY ROBERT KOPECKY

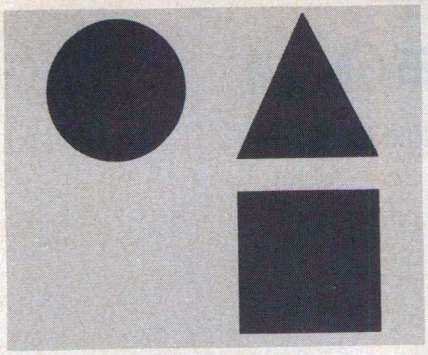


Figure 1: A simple arrangement of geometric shapes that can be described as a Prolog program

accurate, and we can now test the computer's "knowledge" of the picture. For example, you ask the question "What is exactly above the square?" this way:

```
?- exactly-above(X,square).
```

Prolog responds by printing

```
X=triangle
no (more) answers
```

If you wanted to ask if the triangle were exactly left of the circle, you would enter

```
?- exactly-left(triangle,circle).
```

And Prolog's response would be

```
No.
```

So far we have been asking only questions whose answers are supplied by information we have provided to the system directly—a typical database activity—but Prolog has an inferencing system that lets it draw conclusions based on rules as well as database facts. Suppose, for example, that we want to know if the square is exactly below the triangle. Our program doesn't say anything about *exactly below*, so Prolog answers no to this query. The solution is to add a rule to the program that defines *exactly below* in terms of other relationships or predicates we have already defined or mentioned. We can define *exactly below* this way:

```
exactly-below(X,Y) :-
exactly-above(Y,X).
```

This Prolog rule says, in effect, that for any objects X and Y, X is exactly below Y if Y is exactly above X.

If we add this rule to the program, the computer can now provide correct answers to questions such as

```
?- exactly-below(square,triangle).
```

Notice that the computer provides the correct answer by inference, not from information about the picture that we explicitly added to the program.

So What's the Point?

The initial Prolog task was to replicate the paper-and-pencil task of picture description. Beyond that, the "dumb" computer offers students an opportunity to create definitions of other spatial relations that are likely to show up in queries for all kinds of pictures. By adding more and more rules describing various spatial relationships, students build the computer's "knowledge" in this domain. After a while, students can replace the description of the first picture with a second one and find that all the rules they created will apply just as well to this new picture as they did to the old one.

Our examples have been simple so far, but they can get quite complex. How would you write a Prolog definition of *left* that would verify that the circle is to the left of the square? As students move from simple to complex pictures, the task of quantifying knowledge be-

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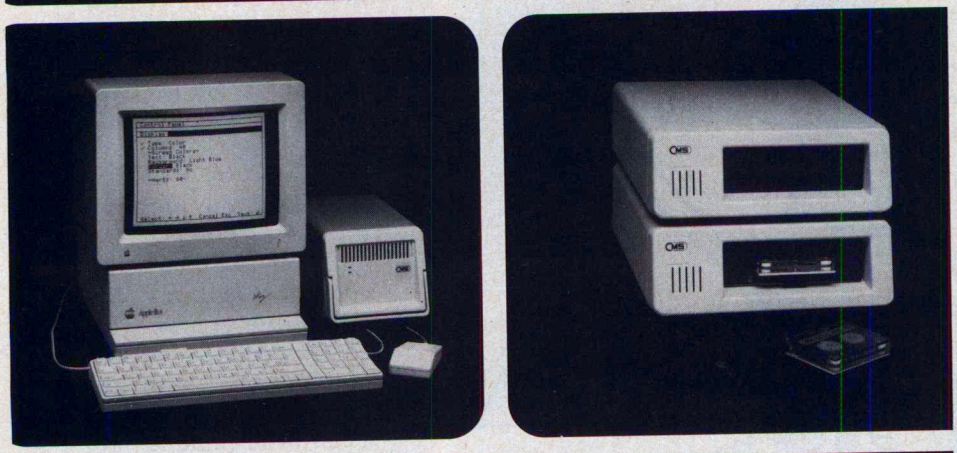

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comes trickier and trickier. For example, instead of describing a simple picture, a student could be describing historical events, complete with rules for determining the outcome of battles, and the like. Assumptions that fail when tested must be refined, so students acquire the capacity to analyze, synthesize, and evaluate problem domains in great detail.

What I find so exciting is that, when they create and test a rule, students learn as much when it fails as when it succeeds. By freeing students to explore the assumptions behind a definition rather than becoming bogged down in computational detail, Prolog allows computer-based exploration of subjects that are outside the scope of languages such as Logo or BASIC.

About Prolog's Syntax

The Edinburgh syntax is clumsy-looking for statements that are simple translations from English. Another dialect called Simple (in Micro-Prolog) allows a much better form for simple relationships. For example,

```
john likes mary if mary likes pizza.
```

is a legitimate expression of a rule in this syntax. Much work is occurring in Europe and elsewhere to make Prolog easier for children to use. Thus far, Prolog activities are in their infancy in the United States, but there are signs that this situation is changing.

As of May of this year, several fine Prolog versions are available on the Macintosh but almost none for the Apple II family. With many Apple II computers sporting 128K or more of RAM, the lack of Prologs for this machine comes from neglect, not technological limitations. If you want to play with Prolog, you can write to Logic Programming Associates Ltd. (10 Burntwood Close, London SW18 3JU England; telephone 01 874 0350) to obtain Micro-Prolog for the Apple II .

We could have useful versions of Prolog (as the Europeans have on their classroom computers) if we let people know that we wanted them. As far as I'm concerned, Prolog is too powerful a tool to be ignored in our classrooms. Let's open our minds to some European ideas. We have a lot to gain! +

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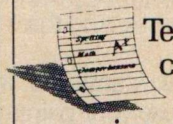

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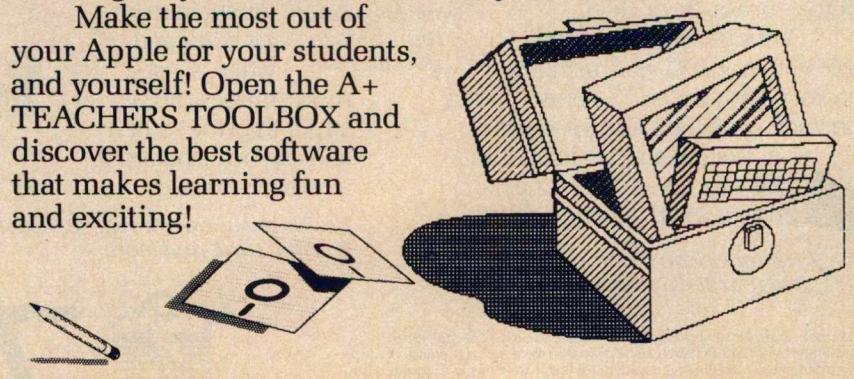

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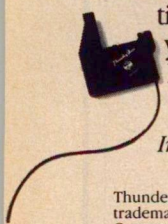

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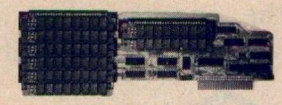

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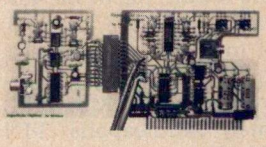

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MECC (Minnesota Educational Computing Corporation), 3490 Lexington Avenue North, St. Paul, MN 55126; (800) 228-3504; in MN (612) 481-3500

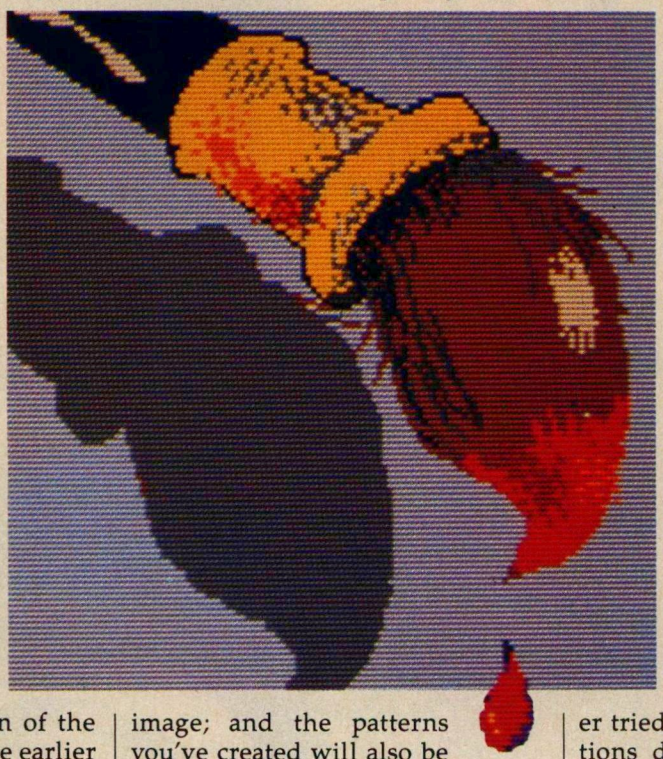
You can reach Education News Service at Box 1789, Carmichael, CA 95609.

BY ROBERTA SCHWARTZ AND MICHAEL CALLERY

PAINTWORKS PLUS REVISITED

Activision responds to user concerns.

Since our review of Paintworks Plus (see "Speaking of Graphics," May 1987), we've received comments from many people who have had difficulties with the program. Until recently, this program was the only Apple IIGS graphics application, and we know that Activision has sold tens of thousands of copies of it. We'd like to take this opportunity to set the record straight on Paintworks Plus and essentially provide you with a primer on some of the most-asked questions about the product.



After several discussions with Activision about the problems reported by our friends and readers, and those that we'd discovered ourselves, we agreed to give Activision some space in our column so that it could respond to these issues. Since our original review of Paintworks Plus appeared, Activision has released a new version of the product that addresses some earlier difficulties, so you'll see some references to a new release.

First, we'd like to apologize for some erroneous statements we made in our review. Roberta had problems saving her files, but perhaps they were due to a defective disk. So, for the record: When you save an image in the Screen format ($C1), only the visible part of the image (the part of your picture that you see when you choose Full Screen from the Goodies menu) will be saved; the size of your file will always be 65 blocks. Any patterns you may have created will not be saved with the image. When you save your image in the Paint format ($C0), the program saves the entire page your picture is on; the size of your files can vary, depending on the complexity of the image; and the patterns you've created will also be saved. When deciding which format to choose, take into consideration that $C1 files are the GS standard; these files are compatible with other GS programs.

And now, here are Activision's comments, presented in a question/answer format.

Activision Responds

Q. Why does the Print command have to be issued twice to start the first printout?

A. The revision has been tested extensively for this problem. It did not occur in any of our testing.

Q. No matter what the leftmost color on the palette is, it prints as white. The rightmost color, however, prints whatever color is selected. How do I get the leftmost color to print?

A. This problem is not a bug. By design, Paintworks Plus does not print the background color of a picture. Since the leftmost color is usually the background, it does not print. We more fully explain this issue in the addendum to the program's documentation, which is included in the Paintworks Plus revision.

Q. During printing, all menus are enabled except for the File menu. If you select a desk accessory (e.g., the clock) and return from it, the File menu is restored, and selecting anything from it crashes the program. Is there a way that we can avoid this problem?

A. Although the developer tried to lock out any File operations during printing, it appears that he didn't catch this sequence of keystrokes. The revision gets around this situation by preventing you from doing any other operations while a picture is being printed.

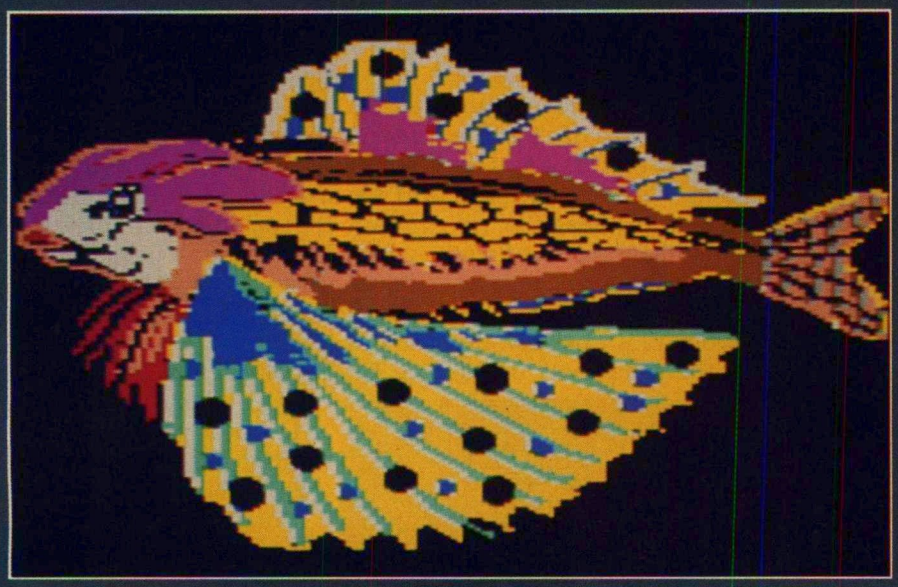
Q. Is there any way to exit from a printout in progress?

A. There is no way to exit from a printout in the first release of the product, but this limitation has been fixed in the revision. Typing

SPEAKING OF GRAPHICS GALLERY

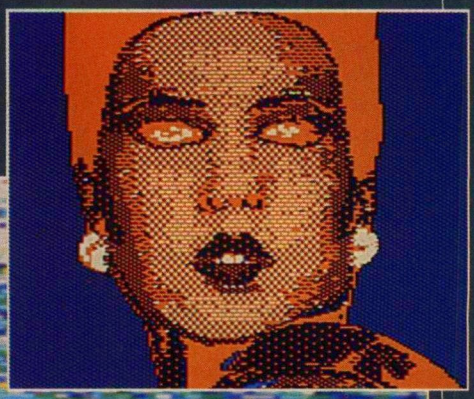
Our gallery artists have created exciting images with joysticks, mice, digitizers, and graphics tablets. Blazing Paddles and Dazzle Draw appear to be software favorites. Penny Baker and Scott Anderson used double hi res with Dazzle Draw and an Apple Graphics Tablet; Thierry Lombry used Blazing Paddles and a joystick; and Ron DeCostra used hi res with Computer Eyes and Blazing Paddles.

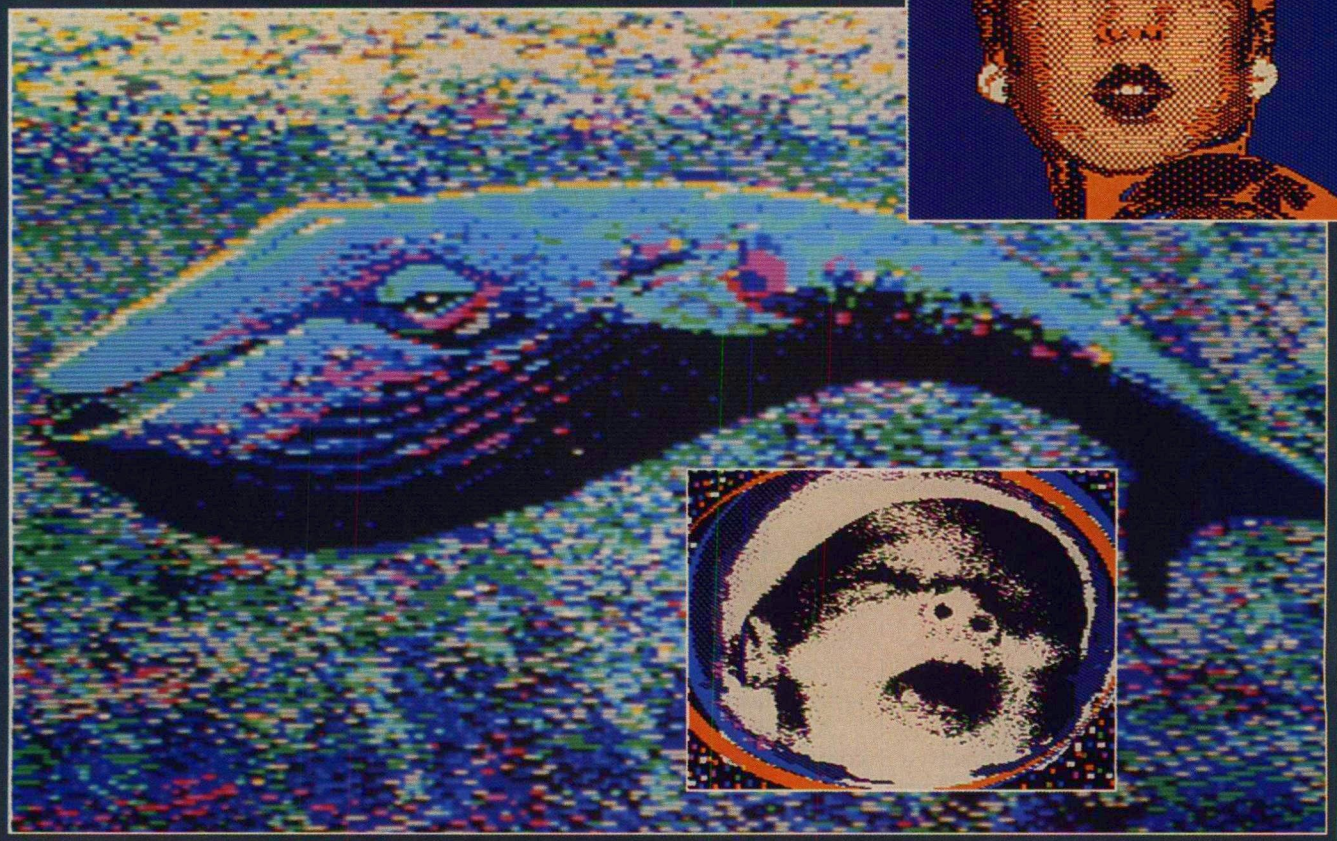
FANTASTIC FISH, **PENNY BAKER,** *New York, NY*



A+ invites readers to submit artwork created with the Apple II to the "Speaking of Graphics Gallery." We will pay $25 for pictures selected for publication. Submissions must be on a diskette and include a written description of the hardware and software used. When submitting pictures made with Dazzle Draw, please format your disk with a slide-show option so we can boot the disk and look at the pictures. Send your artwork to *A+* magazine, 11 Davis Drive, Belmont, CA 94002, Attn. Graphics Gallery. Submissions cannot be returned.

FEMME, **THIERRY LOMBRY,** *Wepion, Belgium*





BLUE WHALE, **SCOTT ANDERSON,** *Santa Rosa, CA*

INSET: BABY'S FIFTH MORNING, **RON DeCOSTRA,** *Monaca PA*

⌘. stops the printout. You'll find this change documented in the manual addendum.

Q. If you start a printout before the printer is ready, the system hangs, with no way to exit from it. Is there any way around this difficulty?

A. The hardware is not set up to handle this situation without locking up. You can usually recover from such an occurrence by hooking up the printer correctly, turning it off and then back on, and then waiting for the program to resume.

Q. In some cases, saving and deleting a file from the master disk leaves the program unable to print. Rebooting does not help—the disk is permanently damaged. What can we do about it?

A. Our product-support department has seen Paintworks Plus disks on which the user has deleted system files and even ProDOS. Some users have even formatted the disk. The documentation specifically tells you not to save anything on the Paintworks disk, in order to avoid this type of problem.

Q. After printing, selecting Quit causes the computer to crash, rather than return to the boot program, which happens if you don't use Print. Is this result avoidable?

A. We were not aware of this problem, but it does not occur in the Paintworks Plus revision. We may not have heard of this problem because if users were going to quit anyway, they probably would not have considered it serious enough to notify us about.

Would you rather have software, albeit flawed, as soon as possible, or wait for months for a relatively 'bug-free' program?

Q. Is it true that lassoing a long horizontal object can crash the program?

A. This tendency is a bug that we have corrected in the revision.

Q. Can overlapping lines in the Lasso mode crash the system?

A. We cannot reproduce this bug, but it does sound like a variation of the first lasso bug, which has been corrected.

Q. The line-width selection menu (lower left of the screen) vanishes intermittently. How do we get it back?

A. Since you can change the color of the lines drawn by the line tool to white, they will seem to disappear when you do so, especially since the lines appear on a white background.

Q. The "recommended" method of using the program with a hard-disk drive is to copy the files to the hard-disk drive and then use the master disk as a "key" disk, inserting it after bootup when the system asks for it. A problem arises, however, if you do so and then attempt to access the Palette Table. The program prompts you to insert the boot disk. What can we do about this?

A. We are looking into this issue and may address it in a revision of the product that would let the palette be saved to a disk other than the Paintworks Plus program disk.

Q. The Dispose Color command does not function for the lower third of a "full-page" picture ($C0) even if you use the "hand" to drag the area into the work area of the program. How do we get it to work?

A. This is indeed a bug and has been fixed in the revision.

Back to Us

If you're a registered owner of Paintworks Plus, call or write to Activision for the (free) Paintworks Plus revision. Along with the revised copy of the program, you should receive an addendum to the documentation. We returned a disk and, although we received the software, it included no documentation addendum. Perhaps it wasn't ready yet.

We'll end this Paintworks Plus discussion with a question: When you're anxiously awaiting applications for a new machine, would you rather have software, albeit flawed, as soon as possible, or would you rather wait months, or even a year, for a relatively "bug-free" program? Drop us a line and tell us what you think. Also, if you've had other problems with this or any other program, please let us know so we can alert other readers and check it out. ✚

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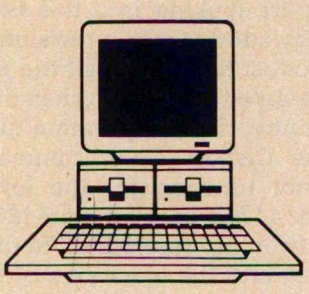

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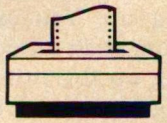

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CIRCLE 106 ON READER SERVICE CARD

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ENTERTAINMENT GAMEPORT

BY BOB LINDSTROM

Lindstrom collects prize for managing presidential candidate to simulated election win and ferrets out software bargains.

THE WINNING TICKET

You don't think that computers are dangerous, subversive tools of a technologically obsessive society? If you don't, then here's a shocker: A computer elected me as the next president of the United States.

I have no doubt that my wife would make a wonderful First Lady: outgoing, beautiful, and cool under pressure.

But me as president?

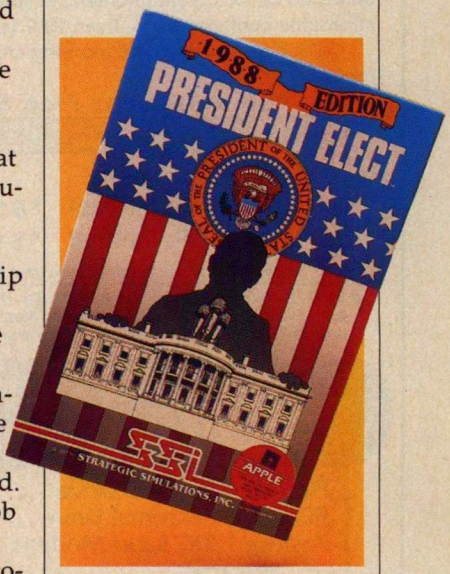
I can see the door flying open in the oval office: "Mr. President, Chernobyl has blown up again. The Pacific Rim is in danger. General Secretary Gorbachev is on the hot line. Congress anticipates a major war in the Middle East. We need you on the Hill, now!"

"Dammit, Tip, how many times have I told you not to interrupt me while I'm playing Wizardry? You know I can't save a game in a dungeon."

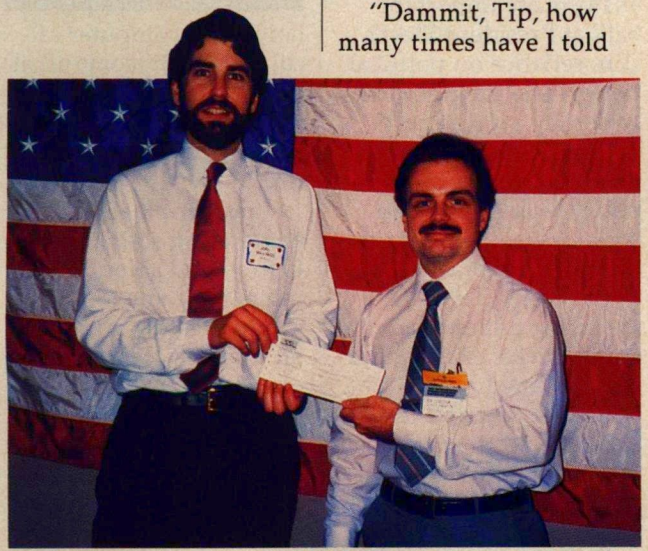
The only way we could get anything done in Washington would be to cut off all electric power to the White House. And what kind of nation would we have if it were run by a president who was completely in the dark? (OK, so maybe that isn't such an unusual situation.)

Don't start looking into Canadian citizenship yet. It wasn't the real thing, just an incredible simulation: President Elect from Strategic Simulations, Inc. (SSI), to be exact. And, in truth, George Bush was elected. But it was Sweet Old Bob who managed his campaign to a landslide victory of 499 electoral votes.

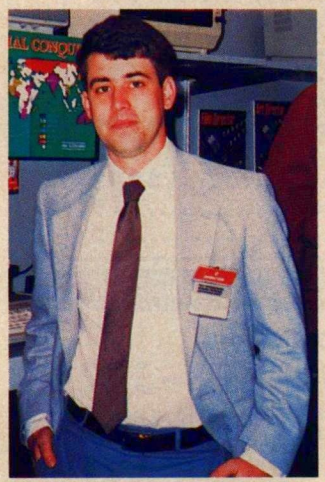
The occasion was a promotional party that SSI held to publicize the new edition of President Elect. Several writers and editors of computer magazines competed head to head on the computerized road to Washington. To make a long campaign short, I won.



Designer and programmer Nelson Hernandez, Sr., was watching Ronald Reagan tromp all over Jimmy Carter in the 1980 election when he realized that a presidential campaign was ideal fodder for a computer simulation. The product of that inspiration was President Elect, a simulation of the last nine weeks of a presidential campaign, from Labor Day to election day. Three years after President Elect was released in 1981, a computer magazine used that inaugural version of the simulation to predict accurately the

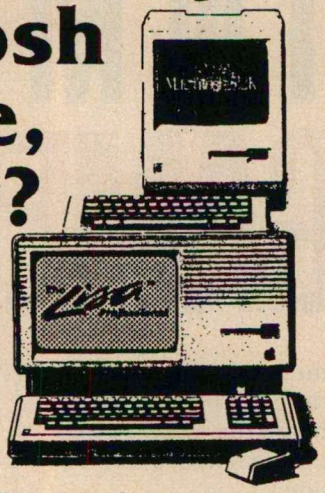


'AND THE WINNER IS' . . . BOB LINDSTROM (RIGHT) RECEIVES $500 PRIZE CHECK FROM SSI PRESIDENT JOEL BILLINGS FOR MANAGING GEORGE BUSH TO SIMULATED ELECTION WIN.



PRESIDENT ELECT DESIGNER AND PROGRAMMER NELSON HERNANDEZ, SR.

You could buy a Macintosh for more, but why?



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CIRCLE 103 ON READER SERVICE CARD

GAMEPORT

It's nice to have strong opinions but only after you're in office.

1984 election results.

In the game, up to three human or computer participants choose to manage a real-life candidate (President Elect can simulate Democratic, Republican, and independent presidential hopefuls). They also identify the home state of the running mate (nothing else matters for the would-be VP). Then, players manage their budget, incurring normal campaign expenses along with the cost of national advertising, regional advertising, and personal appearances. At the end of a simulated nine weeks, America has a new chief executive.

Individuals who think that election issues and answers are important balk at President Elect's slim reliance on political policy. The program only generally rates a candidate's liberal or conservative leanings on foreign policy, economics, and social issues. Success in this simulation is achieved by cleverly spending national-advertising bucks, blitzing the regional media, and whistle-stopping the candidate to all the right places for a little grassroots glad-handing.

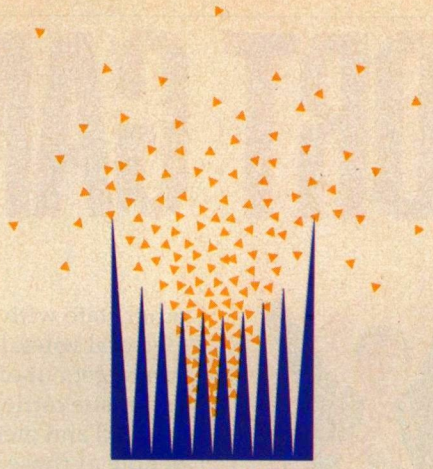
In short, Hernandez is making a statement on the marketing of the president. "That late in the campaign, after Labor Day, the issues really don't matter anymore," Hernandez states. "I am saying that at that point in the campaign, the issues are pretty well known. Selling the candidate is the most important thing."

And sell you must in President Elect. You have a limited amount of (laundered?) bucks in the coffers and a candidate who has only so much energy for campaigning (an exhausted candidate steps all over his tongue and blurts embarrassing things to the press). A savvy campaign manager carefully doles his resources into only the most effective channels.

At the end of the simu-

lation, the computer calculates the outcome all at once or, for those who love the drama of election night, in agonizing real time.

President Elect is a stimulating solitaire simulation and an outstanding party game for a group of adult-minded enthusiasts of computers or politics. The new version simulates campaigns back to 1960 and also includes data on those politicians likely to be involved in the 1988 election. So, you can simulate the future until the fate-



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CIRCLE 212 ON READER SERVICE CARD

GAMEPORT GAMEPORT

ful night arrives next year.

To give "GamePort" readers a competitive edge, here are a few tips from this successful poll pirate.

Go with the incumbent party. Unless the party in power has lifted inflation to 25% or accidentally dropped a bomb in downtown Poughkeepsie, choose a candidate who belongs to the party of the current president.

In all things, moderation. Jack the Ripper isn't going to get elected president, and neither is Casper Milquetoast. It's nice to have strong opinions but only after you're

in office. Until then, go with a middle-of-the-road type who seldom inspires but never offends.

Don't campaign in North Dakota. Or Wyoming, or Idaho, or Vermont, or any other state with minimal electoral votes. It could be fun to get out on the road and rustle cattle, dig potatoes, ski and meet the fine people of those fine states. But we're after electoral votes here, and the big numbers are in places such as Texas, California, Ohio, and New York.

Don't Blow the Bankroll. A flashy blast of media dollars at the beginning or end of the campaign is impressive. Unfortunately, a single flare of celebrity doesn't win the election. Budget those bucks and spend evenly throughout the nine weeks. Carefully tending your favorable states and cautiously cultivating the uncommitted do more than an isolated grandstand play.

Put those techniques into use and start planning your inaugural ball. Just don't let success in the simulation make you believe you're ready for the real thing. It takes years of conniving in back rooms to truly prepare for the presidency. On the other hand, do you think America is ready for a candidate who comes out strongly against software piracy and in favor of low-priced entertainment software?

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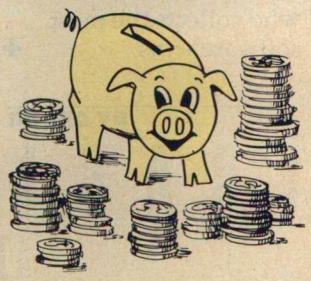
GAMEPORT

CHEAP THRILLS

You've spent your last five bucks on suntan lotion and a handful of Pop Rocks. Now, it's back-to-school time, and the stash for clothes, books, tuition, and supplies is shriveling away.

Whether you're on the low or high side of graduation, September can mean a financial ebb. How are you supposed to get a software fix?

Don't worry. If you've got only $10 or $20 to your name, software publishers want it, and they're prepared to offer



a deal you can't refuse. The deal is budget-priced software, and it's the newest addition to the product line of almost every major publisher.

Typically, these affordable goodies are less than $20, sometimes way less, and consist of golden oldies or foreign imports. If you missed the oldies the first time around or want to check out the gaming action overseas, these discount specials can sooth that nagging need for a new diskette.

Polarware was one of the first companies to slash prices, with $8.95 specials such as Sword of Kadash, Xyphus, and Pensate and $17.95 graphic adventures such as Oo-Topos, Transylvania, and the upcoming desert fantasy Talisman.

Brøderbund Software has raided the archives and teamed up the best-selling Choplifter!, Dan

If you've got only $10 or $20, software publishers want it.

Gorlin's helicopter arcade/simulation, with the vintage pinball outing David's Midnight Magic, both for $14.95. At the same price is one of my all-time favorite Apple arcade games, Capt. Goodnight and the Islands of Fear, a swashbuckling and rib-nudging amusement with fast action and impressive graphics.

On the two-player front, Accolade has combined Spy vs. Spy I and II for $14.95. Split the cost of this package, and you and a friend can join in hostile competition for very little cash.

Spy vs. Spy III: Artic Antics is one of two $19.95 titles launching the debut of Epyx's Maxx-Out line of software. The other is Boulder Dash Construction Set.

Activision's Solid Gold Software line has just welcomed several titles into the $14.95 fold, including Hacker, Ghostbusters, Little Computer People, and The Great

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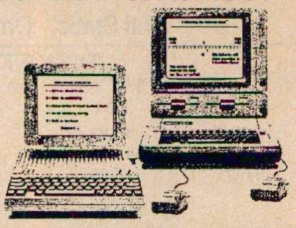

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CIRCLE 329 ON READER SERVICE CARD

New Advice

Open-Apple is Tom Weishaar's monthly newsletter for knowledgeable Apple II users. It's thin but packed tight with Apple II lore, humor, letters, tips, advice, and solutions to *your* problems. Compared to other Apple II publications, ***Open-Apple*** has the highest new-idea-per-issue ratio, the clearest writing, the funniest cartoons, the longest index, the *only* warranty (all your money back if you're not satisfied), and it takes up the least shelf space. The only thing it doesn't have is the most subscribers. Yet.

II cue #13

When you specify information about your printer, AppleWorks asks whether your printer supports top-of-page (form feed) commands. Almost all printers do. However, you'll find that with many printers, including the ImageWriter, the page length function within AppleWorks will not work correctly unless you specify "no" for "accepts top-of-page commands." For much more about dealing with printers, see our November 1985 special issue: Solving Printer Problems.

From our fan mail:

We bought AppleWorks for the D.A.'s office but couldn't get it to support legal-length forms. Your tip about AppleWorks' "accepts top-of-page commands" foible really saved the day here in Weatherford and throughout the county of Parker. You sure made the D.A.'s bunch happy. Lord help the poor soul who ever gives you a hot check in Parker County.

Gary Maddox
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CIRCLE 140 ON READER SERVICE CARD

GAMEPORT

Discount specials can soothe that nagging need for a new diskette.

American Cross-Country Road Race. And the same company's Electric Dreams label offers Spindizzy ($14.95), an intriguing variant on Marble Madness, and The Rocky Horror Show ($19.95).

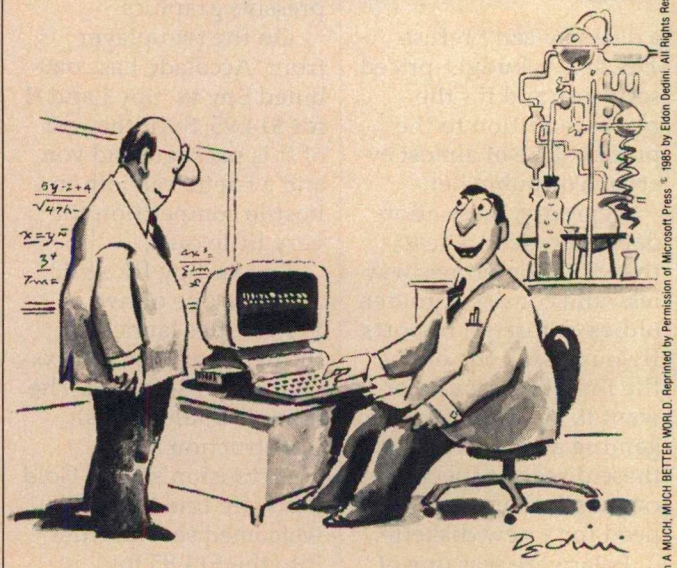
Also equipped with a selection of inexpensive vintage titles are Infocom with Deadline, Starcross, Suspended, and Infidel—direct from the company for $14.95 each; SSI carrying Computer Baseball, Germany 1985, and Six-Gun Shootout at $14.95; Electronic Arts tagging $14.95 on Archon, M.U.L.E., One on One, Age of Adventure, The Seven Cities of Gold and others; and Spinnaker, whose graphic adventures Perry Mason: The Mandarin Murder, Nine Princes in Amber, Dragon World, Rendezvous with Rama, and Fahrenheit 451 are each $14.95.

And Mindscape has founded an entirely new division, Thunder Mountain, to market $9.95 titles such as Maxi Golf, Scott Adams' Adventureland, and Sea Dragon.

That settles it. You no longer have any excuse for walking around with a spare $10 in your pocket. Remember the ultimate game: He (or she) who collects the most software wins. ✚

BY DEDINI

LAUGHTRACK



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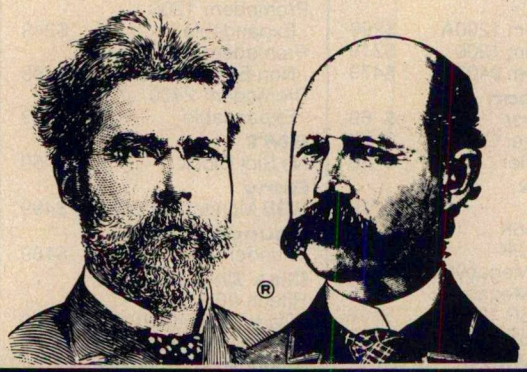

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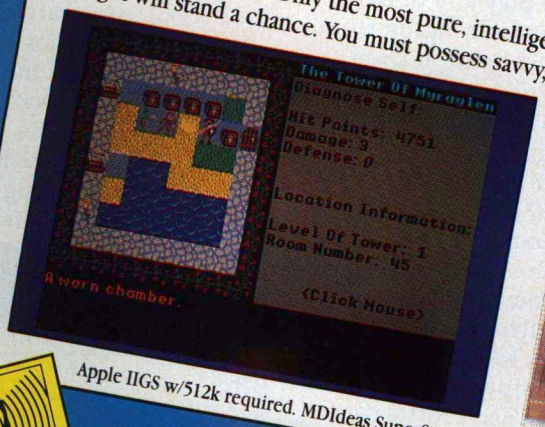

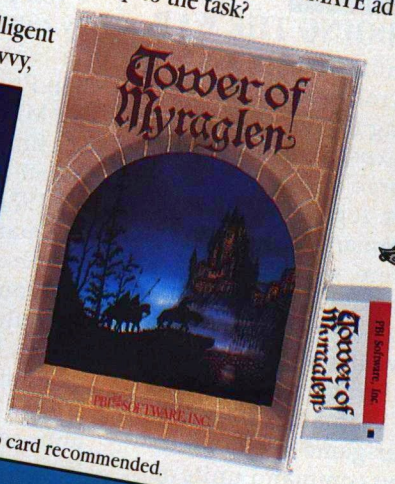

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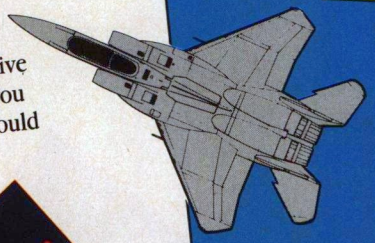

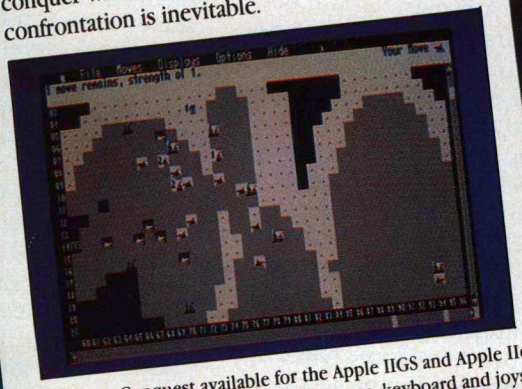

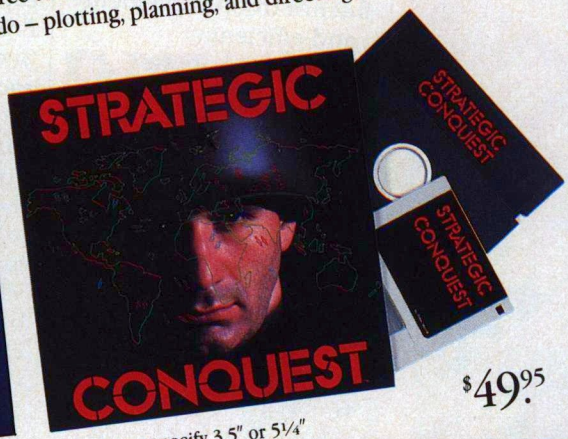

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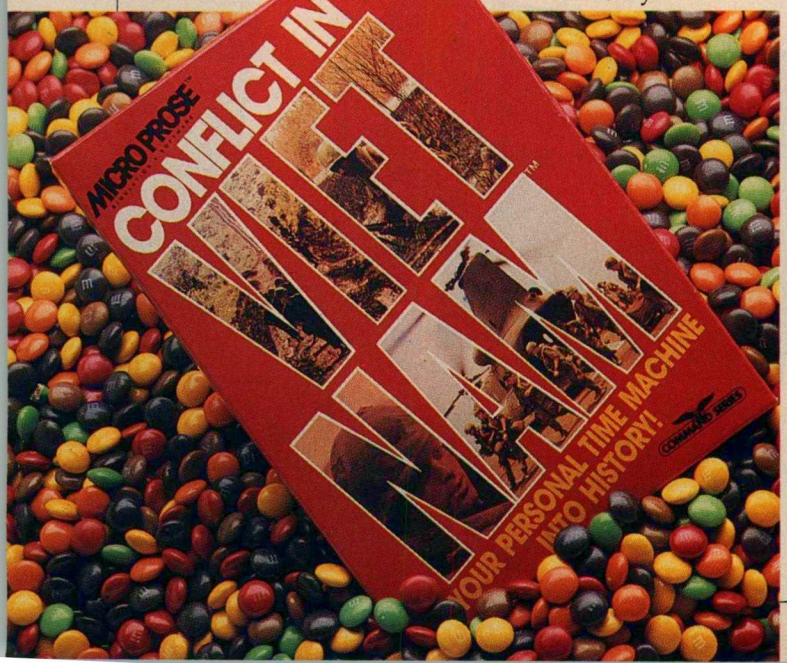
ENTERTAIN

Rewrite the history of the Vietnam War, tag terrorists on the open sea, and tangle yourself hopelessly in red tape with this month's games.

REDOING THE WAR

Conflict in Vietnam from MicroProse did something for me that I'd never expected—it put me in charge of the Vietnam War. It gave me the command and said, "Here, you run the show." It's not a job I ever wanted, but I thought I'd give it a try.

Structurally, Conflict in Vietnam is a typical war-game simulation. You command units of varying strengths and mobility against similar enemy units on a gridded map. Each side makes "moves" and deploys its units to carry out its strategy, whether it be a search-and-destroy mission or a dig-in, fortify, and defend operation. Terrain type, weather, and even time of day influence troop movement and efficiency.



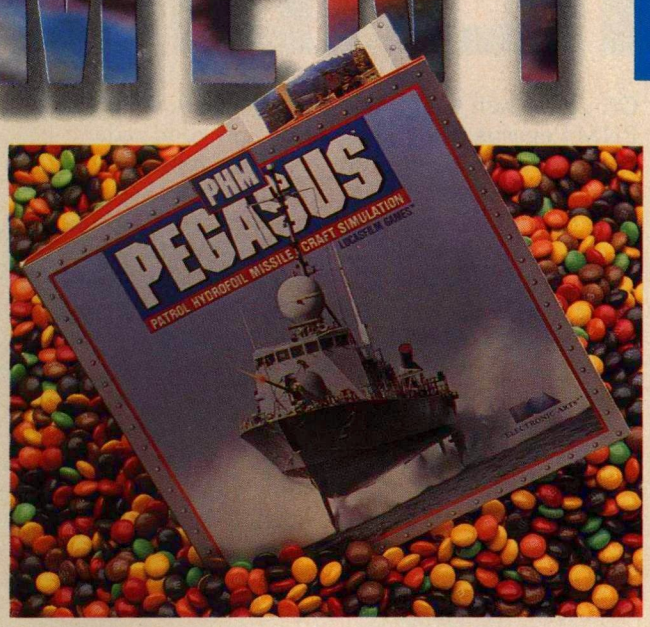
You play any of five key battles, ranging from the 1954 battle at Dien Bien Phu in which Ho Chi Minh's superior strategy finally drove the French out of Vietnam, to the 1972 Viet Cong attack on Quang Tri that foretold the eventual North Vietnamese victory. Other battles are Ia Drang (1965), Khe Sanh (1968), and Empty Fishhook (1970). Each battle contains several variants, letting you see what effect certain other strategies might have had on the key battles of the war. You can select built-in advantages for one side or the other, a good tactic when you're first learning the game, or you can play the historically accurate confrontation. In each scenario, you are encouraged to command each side (American or French, or Viet Cong), one after the other, and each variant in turn.

A typical variant occurs in the first simulation. At Dien Bien Phu, the French had appealed to the Americans to come to their aid in securing Vietnam. After much debate, the Americans declined. In one variant of the Dien Bien Phu debacle, you can see what might have happened if the Americans had come in with the project codenamed Condor.

You play the game by first reading the description of the current situation in the manual, a literate and informative guide to the strategies behind the scenes and the overall state of the war at the time of each battle. You read the objective for your side and some suggestions for possible strategies, and then you begin the game.

The game itself contains many commands. You choose a unit with a joystick or keyboard, and its name, strength, type, current orders, condition, and other pertinent information are displayed. Another press of button or key displays the order screen. You can have a unit attack, defend, move, or become a reserve unit. Each activity has an effect on the unit's vulnerability and overall energy level. For instance, units in the move formation are very vulnerable to attack but can cover ground quickly. In the attack formation, the unit moves more slowly and tires more quickly but is better able to cope with attacks. In the defend formation, units can move slowly

MENT REVIEWS



but are not particularly vulnerable. An individual unit may take some time to carry out your orders, so you must be prepared and think ahead, or your plans will often be carried out too late.

You can also change the time scale to speed up or slow down the action or freeze the game (the best way to issue your orders). You can play against the computer or another player and even switch sides during a battle. The game has rules for various ways to structure a player vs. player game. You can save games in progress and retrieve them later.

For experienced wargamers, Conflict in Vietnam presents an interesting opportunity to try to overcome the forces of history and win the war that America lost. For anyone interested in understanding Vietnam from another perspective, this game is excellent. The first battle is presented in a tutorial format, so beginners need not be intimidated by the complexity of the war-game format.

Although Conflict in Vietnam doesn't present the bloody, brutal, and painful aspect of war that movies and books have emphasized, neither does it present the unrealistic viewpoint of the communist guerillas as targets for Rambo-like American heros. It shows, in fact, that the North Vietnamese often employed superior strategy against overwhelming forces and that, quite possibly, the Americans made mistakes in their deployment and strategy. The actual conclusions you might reach will depend on your experience with the program, but the manual and the battle variants contain sufficient information to suggest these ideas.

Conflict in Vietnam presents the Vietnam War from a strategic perspective and gives you the opportunity to relive the battles and try different stratagems. Although it's only hindsight, the perspective it offers is well worthwhile, and the learning this simulation provides is of a kind that no book, movie, or class can duplicate. This program would be an excellent aid in history classes that dealt with the Vietnam War.

The strategic perspective is, of course, only one viewpoint—as many realities were involved in the Vietnam War as there were soldiers and civilians—but Conflict in Vietnam presents a general's-eye view of the war that is unique, absorbing, challenging, and educational.

Rusel DeMaria

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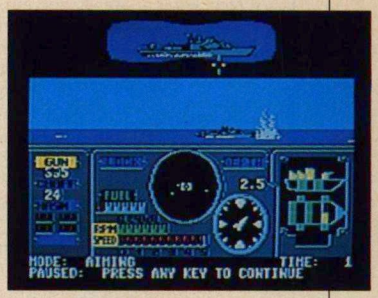

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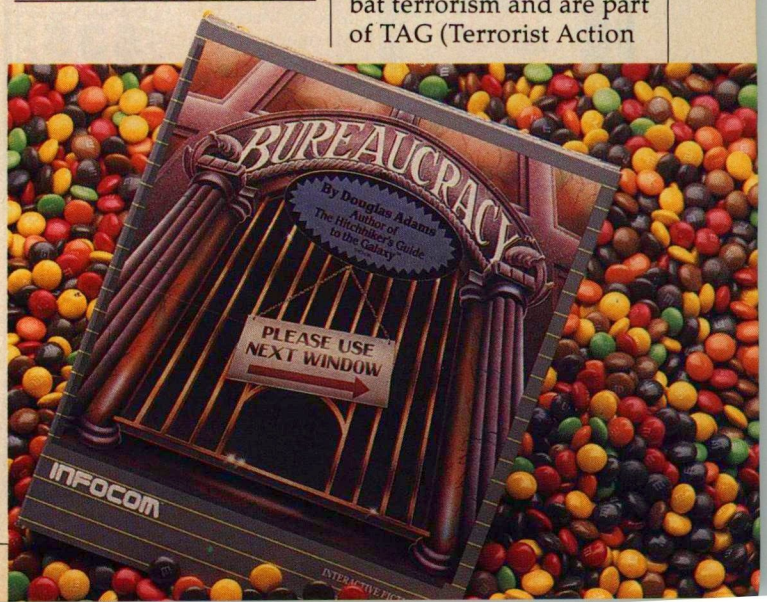

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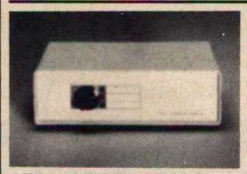

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REVIEWS

Group). When you play PHM Pegasus from Electronic Arts and Lucasfilm Games, you become a member of TAG and set out on an increasingly difficult series of antiterrorist missions.

PHM Pegasus is similar in concept and execution to the popular submarine games GATO and Silent Service. For instance, you have two main screens; the operations map on which you set course; and the bridge, from which you control the ship's operations and weaponry. The scenarios are sometimes similar, although the setting for PHM Pegasus is modern, and the setting for the submarine games is World War II.

PHM Pegasus is similar in concept to the submarine games GATO and Silent Service.

There are some definite differences between the games. For one, the hydrofoil flies above the surface at high speeds instead of diving down. In fact, if the hull compartments have sustained enough damage, the hydrofoil craft will sink, but only after it has slowed down and is off the hydrofoils. Keep moving, and you may survive to complete your mission. PHM crafts can't be as sneaky as submarines, but they have the advantage of speed, maneuverability, and good radar.

The Operations Map is an overhead view of the general mission area, which may be somewhere in the Caribbean, the Persian Gulf, or the Mediterranean. The Bridge is a combination of instrument panels (speed, RPM, radar screen, weaponry, and the like); a window view of the ocean ahead; and a binocular view of enemy targets, which you select by pressing T on the keyboard (when in range).

The game includes an excellent manual full of hints, scenario descriptions, technical details, and even a set of perforated cardboard ship-identification cards to help you identify your enemies, their strengths, and their weaknesses. There is also the usual Electronic Arts command-summary card, which you may want to have handy the first few times you play the game.

You control most of the action from the keyboard, although you can turn, speed up, slow down, and fire missiles or guns using a joystick. The hydrofoil has five speeds, up to 40 knots, which you can control with the joystick or select from the number keys on the keyboard. Up to three types of missiles are available, including Harpoon missiles, accurate, long-range weapons; Gabriel missiles, high-power, very accurate Israeli missiles with a slightly shorter range; Exocet missiles, French weapons similar to the Harpoon missile;

REVIEWS

and finally, a set of Chaff rockets, special antimissile protection that sends up a screen of aluminum foil to confuse incoming enemy missiles.

On some missions, you may have the services of one or two helicopters to help you locate potential enemies, and you may also have friendly convoys to protect.

You can set the course of the PHM and any helicopters or convoys from the operations map. Once you've set a course and speed, the craft continue on autopilot until you alter course. Also, because some scenarios require covering a lot of territory, you can accelerate the time frame of the game up to 128 times. If you are fired on, the time frame automatically reduces to 8 times normal if it was higher. You can also change your radar range anywhere from 2.5 miles to 40 miles. Because Chaff rockets are effective only if you time them to coincide with arriving missiles, you may want to change the radar scale to get a more accurate reading on the location of incoming missiles.

During battle, the action heats up rapidly. When an enemy missile locks on your PHM, a warning sounds until danger passes. Spouts of water represent near misses from enemy guns, and your guns are generally blasting away while you quickly select targets and switch from missile to rocket to gun, while maneuvering the PHM or adjusting the aim.

When you join a battle, action accelerates immediately. Any hesitation can be disastrous.

When you miss with a gunshot, a special light comes on in the sights showing which way to adjust the aim. You must toggle between the Maneuver mode and the Aiming mode with the space bar. Sometimes it can be very difficult to destroy an enemy with guns alone, but often that's all you'll have left. Missiles go fast, and sometimes they are destroyed by enemy fire. The deck gun then becomes your only weapon. Lose the guns and you're sunk!

Cruising in the hydrofoil in nonbattle conditions is not particularly realistic or interesting, because of the lack of sound effects and the rudimentary nature of the graphics. When you join a battle, however, the action accelerates immediately. Any hesitation can be disastrous. Quick action and keen observation can help you win, but lack of decision or careless use of weaponry can leave you up the creek without a missile.

A certain amount of strategy is involved in completing some of the scenarios, so maybe it's unfair to characterize the game as purely an action game, but the most fun it

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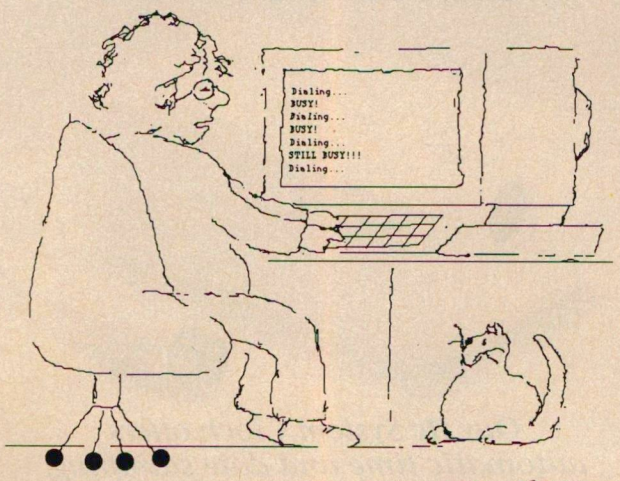

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REVIEWS

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CIRCLE READER SERVICE NO. **416**

SINGING THE RED-TAPE BLUES

Bureaucracy is among the finest games ever written and one of the most original.

Thirty years ago, in 1957, the great playwright George S. Kaufman wrote a humorous magazine piece in which he hypothesized the existence of an enormous organization whose sole raison d'être was to make Kaufman's life miserable. He surmised that the organization was at all times poised and ready to engage in such nefarious activities as arranging for long lines at the bank at whatever moment on whatever day Kaufman, on a whim, decided to do his banking.

Thirty years later, in 1987, Douglas Adams, the best-selling author of *The Hitchhiker's Guide to the Galaxy*, created an original work of interactive fiction called Bureaucracy (assisted by the staff of its publisher, Infocom). Adams was compelled to write this game after *his* bank failed to acknowledge a change-of-address form, thus undeservedly invalidating his credit card. The mess took weeks for him to straighten out, and (of course) he had to argue with several bank officers and fill out a seemingly endless series of forms.

If either Kaufman's or Adams' experiences strike a chord of familiarity, it's because everyone at one time or another has been frustrated by the inflexibility of bureaucratic conventions, whether they involve a bank, the postal service, the telephone company, or the mighty Government itself. Although I'm sure most of us indulge in a bit of "Why me?" paranoia when things go awry, we have the good sense to know that bureaucratic foul-ups are merely facts of life. No matter how persecuted we feel, there really *isn't* a plot against us. But in our era of FBI files and secret surveillance, how can we be 100% sure that someone somewhere isn't diabolically planning all of the daily annoyances that unnerve us?

Of course, in a work of

REVIEWS

A nerd constantly pops up out of nowhere trying to sell you things and meet your sister.

fiction, particularly a satirical work of fiction, anything is possible, and taking situations to their extreme is a literary (and dramatic) conceit. In doing so, Adams has succeeded brilliantly. Bureaucracy is among the finest games ever written and one of the most delightfully original. It matches, and at times surpasses, the highest standards set by Infocom, the acknowledged interactive-fiction leader.

When you experience interactive fiction, you assume the lead role in a story, following a predetermined path to its conclusion—but you have to figure out how to proceed on a moment-to-moment basis. You choose from an almost limitless series of alternatives at every turn, and you must solve a series of puzzles posing as obstacles.

In Bureaucracy, you are a newly hired employee for the Happitec Corporation. You have just moved into a new home and are being sent on an all-expense-paid trip to Paris for a combination training seminar and vacation. All you have to do is take the $75 money order (which should be arriving in the mail) to the bank to cash it, take the letter from Happitec to the travel agency to get your airline ticket, call for a cab, and you're on your way! What could be simpler? Nothing! What could go wrong? Everything!

Naturally, your mail gets delivered to the wrong address. Then a delivery man shows up at your front door with a package of Llama Treats which, even though you do not own a llama, you must pay for (by credit card, of course). The search for your mail sends you on a wild journey through your neighborhood, bringing you in contact with a superparanoid recluse, a weirdo (who looks suspiciously like Woody Allen) carrying an amazingly complete arsenal strapped to his body, a bigoted and deaf old woman brandishing an elephant gun, a foul-mouthed macaw, and—yes—even an affectionate llama. You also have to deal with a snide travel agent, a strange bookstore clerk, and a nerd who constantly pops up out of nowhere trying to sell you things and meet your sister. Lest you think Adams would leave them out, you also have to negotiate with several ever-so-efficient bank tellers. Adams also hurls poison-tipped barbs at waiters who get your order wrong in restaurants, the bewildering geography of airports, and the cloying ubiquitousness of Muzak. Within this last bit is a hilarious swipe at the composer Andrew Lloyd Webber that has

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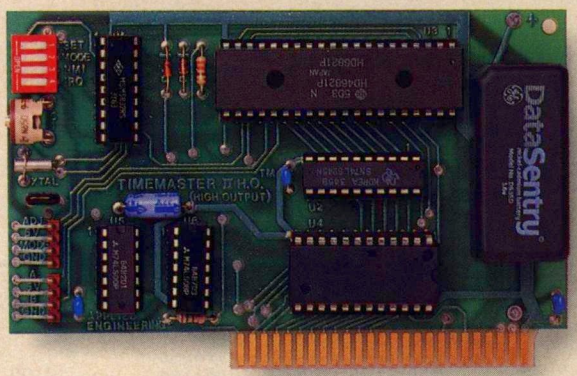

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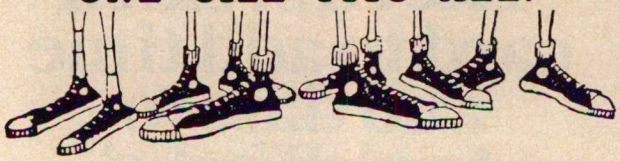

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REVIEWS

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10. Last Fired From: _____ 11. Months at last job: _____

13. Pancakes eaten today: _____ Explain: _____

14. Car Make: _____ Accidents in 1987: _____

14r. Type of accidents:
☐ head-on ☐ sideswipes ☐ fender-benders

15. Check one:
☐ I drink heavily ☐ I chew with my mouth open
☐ I wear ratty underwear ☐ I enjoy sheep

ensured Adams a permanent place in my heart.

You have a lot of misadventuring to do before you reach Paris, and I don't want to give away any more of the delicious plot turns and twists. But I can't resist reporting that in addition to having a scoring system that lets you know from time to time that you're doing something *right*, Bureaucracy also keeps track of your blood pressure, which goes up when something annoying happens. Just like in real life.

Bureaucracy is part of Infocom's Interactive Fiction Plus series, and you have to have at least 128K of memory in your Apple II-series computer to run it. The size of the game means extra complexity and richness of detail. Although Bureaucracy doesn't have much replay value (nearly all adventure games don't, despite their manufacturers' claims), certain changes occur randomly if you start over. For example, the old woman's macaw can be either pro-American, worshiping a picture of Ronald Reagan, or pro-Russian, becoming delirious at the sight of Mikhail Gorbachev.

Bureaucracy is not an easy game—some of its puzzles are quite tough. It is not intended for beginning adventurers, although if you've never played interactive-fiction games before and the idea of Bureaucracy intrigues you, go for it! After all, Adams has written on a timeless theme, one that was as true 30 years ago for George S. Kaufman as it is today, and as it will undoubtedly be 30 years from now. Since there seems to be no likelihood of our winning the war against bureaucratic muddle in our real lives, you will positively glow with pride at winning the war if you succeed in Bureaucracy.

Donald Oliver

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CIRCLE READER SERVICE NO. **417**

BY MICHAEL WIESENBERG

MULTIPLE CRITERIA FOR A MULTIPLE OF 7

In search of a mysterious eight-digit number

Find a multiple of 7 whose square has eight digits of the form *ababbbcc*, where *a*, *b*, and *c* are different digits. An example of a number of the proper form (but not a solution) is 12122233.

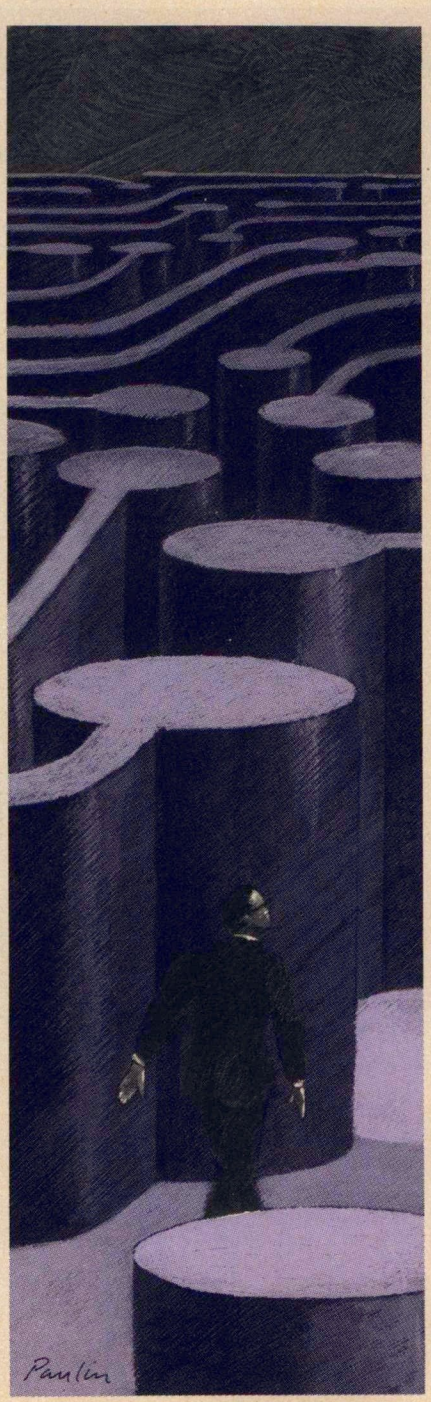
Send a complete program. Be sure to include output and execution time. If you send a disk, please also enclose hard copy. Your program must be short; elegant; and, if not self-documenting, accompanied by a good, concise explication. The best solution wins a one-year subscription (or extension) to *A+*; a copy of *Puzzled Programmers*, the author's book of new computer puzzles; and a Certificate of Excellence in Programming—and will be published here.

Please send all entries, which must be received by September 14, 1987, to Computer Calisthenics, Box 2329, Stanford, CA 94305. Please send entries by regular mail only. The author does not receive in time any mail for which he must sign. All entries become the property of the author. The winner will be selected by the author, whose decision will be final. The winning program will be announced in the December 1987 issue of *A+*.

Answer to June's Puzzle

The June challenge asked for a numeric expression, $abc \times de = fg \times hi$, that involved one each of the digits 1 through 9, with each digit represented by a letter.

Alan LeGrand, of Miller Place, New York, gets an honorable mention for the fastest program. Written in C, it generates all 11 solutions in less than one second. Thomas Wu's Applesoft BASIC program, also deserving an honorable mention, runs in 2 minutes, 50 seconds.



This month's winner, David Fax, of Pittsburgh, Pennsylvania, sent an MBASIC for CP/M program that runs in 6 minutes, 18 seconds.

The program first examines the least significant digits in the problem. In lines 40–80, it seeks sets of four digits that satisfy the relation

```
(g*i - c*e) modulo 10 = 0
```

The ordering of the search precludes duplicate solutions. Of the 210 candidate sets, 40 sets satisfy this first test. One such set, for example, is 4, 9, 7, 8.

For each of the 40 sets that satisfy this first test, lines 130–170 identify the five remaining digits; lines 270–330 permute the five digits, and lines 370–390 test them four at a time in front of *c*, *e*, *g*, and *i*, respectively.

The second test is that

```
(bc*de - fg*hi) modulo 100 = 0
```

Of the 4800 candidates, 495 sets of pairs survive the second test. For example, 34*29 and 67*58 is one such set.

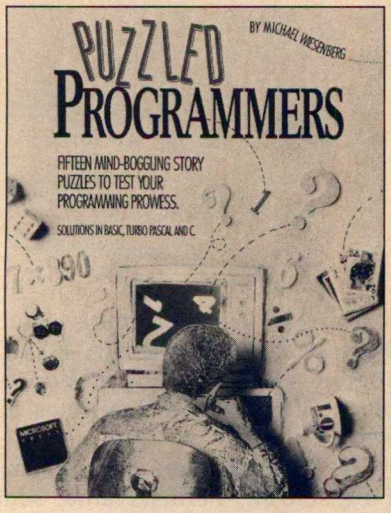
For each of the survivors of this second test, lines 420–440 rotate the last remaining digit of the nine in front of each of the four duals in the set to perform the third and last test, line 480. Of the 1980 candidates, there are 11 survivors.

This program does not run as is in Applesoft BASIC. If you want the equivalent that does, please write me.

SWAP swaps the values of two variables, which must be of the same type.

ILLUSTRATION BY DOUG PAULIN

Hey, Hotshot...



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CIRCLE 175 ON READER SERVICE CARD

Following Fax's program is a run with the solutions.

Corrections

The programmatic solution in the June issue to the March puzzle was incorrectly printed. The IF statements starting at line 120 should be multiple statements instead of written as successive lines, because the execution of each depends on the IF condition. That is, lines 120, 121, and 122 should be combined (into one multiple statement numbered 120); lines 150, 151, and 152; lines 160, 161, and 162; lines 170, 171, and 172; and lines 180, 181, and 182 should be similarly treated.

Parts of three lines in the programmatic solution in the July issue to the April puzzle were dropped. They should be

```
240 PRINT P; MID$ (S$, FN TRC(P)*2*ABS((P <
    10 OR P > 19) AND X <> 1) + 1,2);
270 PRINT K; MID$ (S$, FN TRC(K)*2*ABS((K <
    10 OR K > 19) AND X <> 1) + 1,2);
300 PRINT L; MID$ (S$, FN TRC(L)*2*ABS((L <
    10 OR L > 19) AND X <> 1) + 1,2);
```

Michael Wiesenberg's book of new computer puzzles, The Puzzled Programmers, *was published recently by Microsoft Press.*

JUNE'S WINNING PROGRAM

```
10 REM Solves abc * de = fg * hi; A+ Magazine, June 1987; D H Fax.
20 DIM SB(9), N(8)
30 PRINT "Solutions:" : PRINT
40 FOR C = 1 TO 6 : IF C = 5 GOTO 210
50   FOR E = C + 1 TO 9 : IF E = 5 GOTO 200
60     FOR G = C + 1 TO 8 : IF G = 5 OR G = E GOTO 190
70       FOR I = G + 1 TO 9 : IF I = 5 OR I = E GOTO 180
80         IF (G * I - C * E) MOD 10 <> 0 GOTO 180      'First test.
90         N(5) = C : N(6) = E : N(7) = G : N(8) = I
100        FOR J = 5 TO 8 : SB(N(J)) = 1 : NEXT J  'Set up the scoreboard.
110        N(0) = 1
120          IF SB(N(0)) = 1 THEN N(0) = N(0) + 1 : GOTO 120
130        FOR J = 1 TO 4 : N(J) = N(J - 1) + 1
140          IF SB(N(J)) = 1 THEN N(J) = N(J) + 1 : GOTO 140
150        NEXT J
160        FOR J = 1 TO 9 : SB(J) = 0 : NEXT J 'Clear scoreboard for next trial.
170        GOSUB 240
180      NEXT I
190    NEXT G
200  NEXT E
210 NEXT C
220 END
230 REM SUBROUTINE Permute 5 digits in front of c, e, g, i for second test.
240 FOR L = 0 TO 4 : SWAP N(0), N(L)
250   FOR J = 1 TO 4 : SWAP N(1), N(J)
260     FOR K = 1 TO 3
270       SWAP N(2), N(4) : GOSUB 330 : SWAP N(3), N(4) : GOSUB 330
280     NEXT K : SWAP N(2), N(4)
290   NEXT J : SWAP N(1), N(4)
300 NEXT L
310 RETURN
320 REM SUBROUTINE for the second test.
330  P1 = 10 * N(1) + C : P2 = 10 * N(2) + E
340  P3 = 10 * N(3) + G : P4 = 10 * N(4) + I
350  IF (P1 * P2 - P3 * P4) MOD 100 <> 0 GOTO 400     'Second test.
360  R = N(0) * 100 : M1 = R + P1 : M2 = P2 : M3 = P3 : M4 = P4 : GOSUB 420
370  M1 = P1 : M2 = R + P2 : GOSUB 420
380  M2 = P2 : M3 = R + P3 : GOSUB 420
390  M3 = P3 : M4 = R + P4 : GOSUB 420
400 RETURN
410 REM SUBROUTINE for third test and output.
420  IF M1 * M2 <> M3 * M4 GOTO 480  'Third test.
430  IF M1 > 99 GOTO 470
440  IF M2 > 99 THEN SWAP M1, M2 : GOTO 470
450  IF M3 > 99 THEN SWAP M1, M3 : SWAP M2, M4: GOTO 470
460  IF M4 > 99 THEN SWAP M1, M4 : SWAP M2, M3 : GOTO 470
470  PRINT M1;"*"; M2;"="; M3; "*"; M4;"( =";M1*M2;")"
480 RETURN

Solutions:

 584 * 12 = 73 * 96 ( = 7008 )
 174 * 32 = 96 * 58 ( = 5568 )
 532 * 14 = 76 * 98 ( = 7448 )
 158 * 32 = 64 * 79 ( = 5056 )
 186 * 27 = 93 * 54 ( = 5022 )
 174 * 23 = 58 * 69 ( = 4002 )
 259 * 18 = 74 * 63 ( = 4662 )
 158 * 23 = 46 * 79 ( = 3634 )
 146 * 29 = 73 * 58 ( = 4234 )
 138 * 27 = 69 * 54 ( = 3726 )
 134 * 29 = 67 * 58 ( = 3886 )
```

TIPS AND TECHNIQUES

Readers share tips for the II

APPLE IIGS CREDITS

The ROM in the IIGS contains many secrets, including the names of everyone on the Apple design team. If you want to see the names, first remove the disk from the GS boot drive and then reboot. You will soon see an Apple icon sliding back and forth on the screen. (It was put there by the System Death Manager.) At this point, enter a Control-N while holding down the open-apple and Option keys, and the names will magically appear.

David Montouroy
Le Vesinet, France

REM STRIPPING MADE EASY

Many programmers use word-processing programs to create Applesoft programs as text files and then use the EXEC command to load them into memory. Word-processing programs don't automatically sort according to line number, nor do they delete a line when a line with the same number is entered. Thus, you can include any number of lines with the same number, and you can place them anywhere in the program listing. Of course, when the text file is EXECed into program memory, the normal Applesoft editor takes over, and the duplicate lines overwrite each other as it encounters them.

As a result, you can automatically delete REM statements from your programs by writing them with a word-processing program and following these three rules: (1) put all REM statements in individual lines (none as colon-separated statements), (2) give all REM lines the same line number, and (3) use the line number alone after the last REM so that the last REM will be deleted too. When using this technique, take care not to GOTO or GOSUB to the line number you use for the REM statements.

With the REMs removed from the program, you will discover that the program occupies less memory and runs faster.

Dudley Glass
Vienna, VA

SIMULATOR TRICKS

I have found a trick for flying an F18 in the World War I Ace battlefield with SubLogic's Flight Simulator. I used the Flight Simulator II (A2-FS2) and JET (A2-JT1). Boot the JET program and then place Flight Simulator II into the active disk drive. Next, choose modes 1, 2, or 3; any skill level; and the F18 (carrier-based aircraft). To get to the battlefield, set the throttle to afterburner and imagine you are taking off from the carrier. Press the pitch-up key several times so you don't crash. As soon as you take off, go to a heading of approximately 245 degrees, which puts the battlefield in the direction of flight.

John Allan
Al Khamasin, Saudi Arabia

CAMELEON CURSOR

If you press Control-6 on the IIGS and then type a character, the character you press will become the new cursor shape. To change the cursor within a program, you might have a line like

```
320 PRINT CHR$(30);"M"
```

which would make the cursor change into an M (CHR$(30) is the hexadecimal number for Control-6).

Jon Sintow and Michael Evangelista
Westfield, NJ

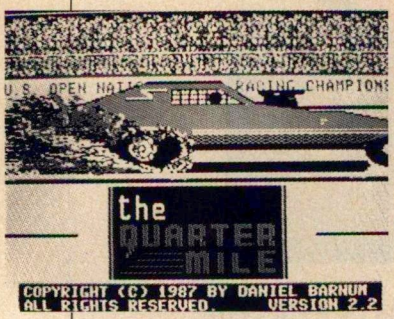
HIDDEN POWER

The Apple-Cat 212 modem consists of two cards, one of which requires power from a special plug that fits onto the IIe power supply. The card then normally lies on top of the power supply without occupying a slot. The power-supply plug is not the same on the IIGS, so to use an Apple-Cat with that computer without rewiring, simply plug the 212 card into slot 3, which is unusable by any other card when the video display is set for 80 columns. The 212 card does not interface with the slot—it simply draws the required power—and has been problem-free for me since I bought my IIGS in October 1986.

S. Corley
Glenview, IL

Please send your Apple II tips to A+, 11 Davis Drive, Belmont, CA 94002; ATTN: Tips and Techniques. We will pay $25 for each tip we publish, so be sure to include your name, address, and social security number.

PIPE



The Quarter Mile, an arcade-style math-drill game available from Barnum's Software

THE QUARTER MILE

An arcade-style math-drill game, The Quarter Mile lets users practice their math skills while racing against their own best five races on a six-lane drag strip. The program features fast animation, adjustable rumbling sound, and provisions for saving entire races and printing out rankings. The Quarter Mile disk covers basic arithmetic; accessory Problem Set disks expand the game to include decimals, integers, fractions, and more.

List Price: The Quarter Mile, $45; demo disk, $2; Problem Set disks, $10 each

Requires: Apple II Plus, IIe, or IIc; 64K RAM; one 5¼-inch disk drive. DOS 3.3, copy-protected; does not work with mouse.

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MATH MASTERY

Estimating is as important as calculating to the folks at Cerebic Institute, which calls its program Math Mastery "an experience in intuitive mathematics." It emphasizes the importance of estimation as well as precision in math and hopes to bring success to math-phobics by cultivating their estimation skills. Mental-arithmetic exercises, as well as the drill and practice of many math programs, are included on the Math Mastery disk.

Cerebic Institute bills its Math Mastery as "an experience in intuitive mathematics."

Cerebic's distribution process is as unusual as the program's premise. Math Mastery is free for the single-player version, but you can pay $12.95 to "subscribe" to the Institute's by-mail math competitions.

Or you can pay $16.95 and get the Math Mastery Instruction Manual. Or you can pay $29.95 and become a Certified Cerebic Evangelist, which means you get a personalized diskette, and every time someone copies your program and subscribes to cerebics, you get a $1 finder's fee.

In addition, a $159.95 school version is available—complete with file folders, labels, and computer paper, as well as a scheduling program with planning sheets to manage 40 players on up to 15 computers for up to 200 sessions per week.

Requires: Apple II Plus, IIe, or IIc (or IIGS with selected slower speed); 48K RAM; one 5¼-inch disk drive. DOS 3.3 on-disk; not copy-protected; does not work with mouse.

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CIRCLE READER SERVICE NO. **502**

KEYBOARD CUSTOMIZATION SERVICE

Hooleon Corporation is now offering a service that provides custom imprinting for computer keys. The service lets you redefine key functions for software support or for multilanguage or scientific use. The company can produce small runs—100 sets of 10 or more keys—and can produce

A new service from Hooleon Corporation provides custom-imprinted replacement keys for your computer's keyboard.

L I N E

imprints either from customers' artwork or from artwork produced in its own graphics department. The company also produces custom molds for keys in special sizes, shapes, and colors in high-quality polyester or ABS plastic. A free 1987 catalog called *Customize Your Keyboard* is available from Hooleon.

Hooleon Corporation
P.O. Box 201
Department KEYS
Cornville, AZ 86325
(602) 634-7515

CIRCLE READER SERVICE NO. **503**

Cool Stack Sentry II provides physical security and prevents overheating of Apple II computers.

COOL STACK SENTRY II

Made of heavy-gauge steel and with a textured, color-coordinated finish, Cool Stack Sentry II is a lock-down device that provides physical security for and prevents overheating of Apple II computers. The system can secure a CPU, keyboard, one or two disk drives, and a monitor and has an adjustable library rack for manuals and disks.

It uses state-of-the-art adhesives to adhere to workstation surfaces and is easy to remove when unlocked. It also features tilt action so users can access the inside of their computer and has a high-quality, low-noise fan. Available options include a power sentry to protect computers from power surges and DISKLOK, which prevents tampering with the disk drive.

List Price: without fan, $139, with fan, $168
Requires: Apple II Plus, IIe, or IIc
Secom Information Products Company
500 Franklin Square
1829 E. Franklin Street
Chapel Hill, NC 27514
(919) 929-3600

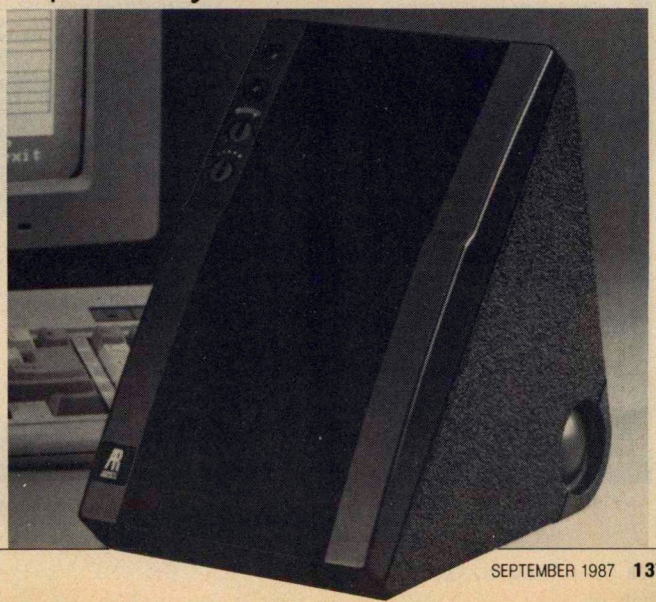
CIRCLE READER SERVICE NO. **504**

AR POWERED PARTNER LOUDSPEAKERS

In addition to using AR Powered Partner Loudspeakers with CD players and personal stereos, you can team them with personal computers and music-software packages. Because the Partner's drivers are shielded to prevent stray magnetic fields, you can use them near monitors and disks without worry. The speakers plug into the audio output of a computer's tone-generator board and come with built-in amplifiers and tone and volume controls.
List Price: $359.95 per pair
Teledyne Acoustic Research
330 Turnpike Street
Canton, MA 02021
(800) 225-9847

CIRCLE READER SERVICE NO. **505**

AR Powered Partner Loudspeakers work with personal computers running music software.



PIPELINE

SOFTWARE

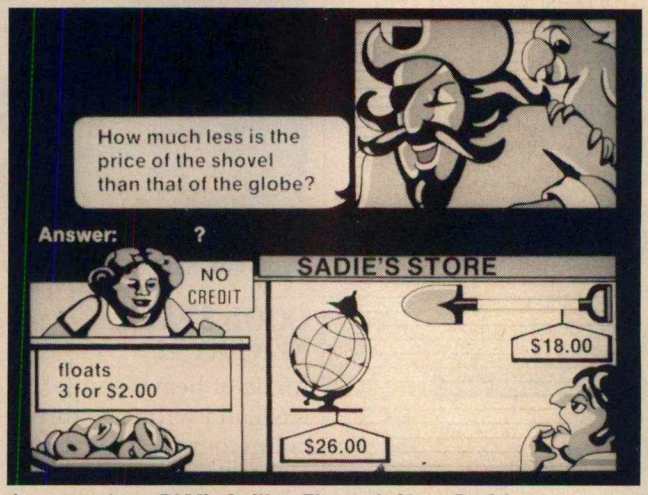
DLM EDUCATIONAL SOFTWARE

DLM Teaching Resources has released several new educational programs. Available in its new Arcademic Intermediate Math Series designed for children in grades 5 and up are Decimal Discovery and Fast-track Fractions. Decimal Discovery offers games with an oil-drilling theme that help students compare, add, subtract, multiply, and divide with decimals ranging from tenths to thousandths. Fast-track Fractions provides drill and practice in comparing, adding, subtracting, multiplying, and dividing fractions in a car-racing setting. Special features of the programs include a choice of three response modes (scan, match, and fill-in), a worksheet generator, an editor for customizing game content, and student tracking and records systems.

Sailing Through Story Problems offers students instruction and practice in solving math story problems. Using a pirate theme, the two-disk program has 12 content levels and presents a variety of problems, including practice in reading maps and charts and working with money. The program has a built-in, on-screen calculator and pro· des students with prompts and hints. Other features include a management system that pinpoints error patterns, the ability to select game options and the number of correct answers required to move up a level, and the options to view records of students' performance on-screen or as hard copy. The program comes with two black-line masters, a key chart, and a users' guide.

A vocabulary-building program, Word Wise I, II, and III: Better Comprehension through Vocabulary features a built-in speech facility that students can use at any time, a range of game-control options, and a record-management system for tracking students' progress. Students can challenge the computer or each other as they match words to definitions, explanations, and examples on an electronic game board. The program comes on five disks with eight black-line masters of reinforcement activities, a key chart, and a teachers' manual.

Teddy Bear*rels of Fun contains a program disk and a graphics-library disk that enable users to design and produce teddy-bear artwork. The



A screen from DLM's Sailing Through Story Problems

ZIMCO
INTERNATIONAL, INC.
85-39 213 St., Queens Village, NY 11427

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NEC Pinwriter P6* $460
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OKIDATA 192+/193+ ..... $340/$554
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CIRCLE 126 ON READER SERVICE CARD

PIPELINE

software contains more than 200 pieces of artwork, including teddy-bear characters, backgrounds, scenes, props, and borders, and a variety of typefaces for writing stories, messages, and captions. Users can print their artwork and produce greeting cards, home accessories, gift items, and more.

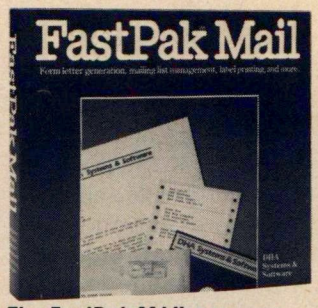
Finally, Create with GARFIELD! is now available in a deluxe edition. The package contains a program disk and a graphics-library disk with which users can design and print Garfield cartoons, posters, labels, and more. The program is also useful for stimulating writing and artistic skills. The deluxe edition offers more than 200 pieces of artwork, a variety of typefaces, the ability to print in color, and an electronic comic in which cartoons move continuously across the screen. It comes with a users' manual and an activity sheet that illustrates its use.

List Price: Decimal Discovery, Fast-track Fractions, Sailing Through Story Problems, $46 each; Word Wise, $59; Teddy Bear*rels of Fun, Create with GARFIELD!, $39.95 each.

Requires: Apple II Plus, IIe, or IIc; 64K RAM; one 5¼-inch disk drive; Echo or Cricket speech peripheral (Word Wise only). DOS 3.3; copy-protected; does not work with mouse.

DLM Teaching Resources
One DLM Park
Allen, TX 75002
(800) 527-4747
In TX (800) 442-4711

CIRCLE READER SERVICE NO. **506**



The FastPak MAIL program for mailing-list management, label printing, and form-letter generation

FASTPAK MAIL

The FastPak MAIL program for mailing-list management, label printing, and form-letter generation is now available for Apple II computers. Menu-driven and easy to use, the program features ZIP-code sorting, duplicate elimination, and the ability to create subfiles based on a variety of criteria. Users create mailing lists using an input module with predesigned screens. In addition to mailing information, the screens contain fields for a job title or comment, a telephone number, and a four-digit reference code. Once users have entered data, the program can search for records by field content or page through the database five records at a time. It works with most popular word-processing programs and allows users to insert fields in the body of form letters in any order.

List Price: $69.95

Requires: Apple II Plus, IIe, IIc, or IIGS; 64K RAM; one 5¼-inch disk drive; 80-column card. DOS 3.3; not copy-protected; does not work with mouse.

DHA Systems & Software
832 Jury Court
San Jose, CA 95112
(408) 947-1011

CIRCLE READER SERVICE NO. **507**

WATER-MANAGEMENT SIMULATION

Produced by the National Survival Institute, a Canadian nonprofit environmental agency, Water Watch is a water-management simulation designed for junior-high-school social-studies students.

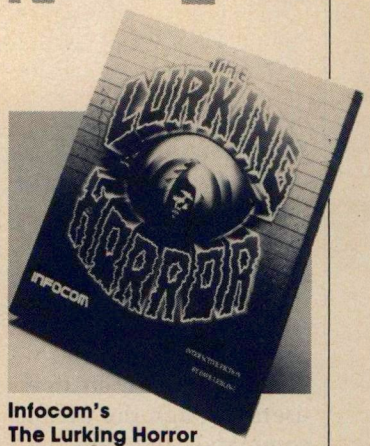
The simulation is available either as an individual unit or as a class set of 15 disks. Also available is an optional learning guide entitled Water Wiz-dom that contains a six-week series of lesson plans and activities in areas relating to water use, conservation, and management. In the simulation, a student is appointed water manager for the city of Watertown and must respond to 12 (of 25) randomly selected events that affect water management. Every decision has financial and water-resource implications, and students can request more information to help them make decisions. The simulation offers three levels of difficulty.

List Price: Water Watch, $69.95; $179.95 for class set; Water Wizdom, $10 each

Requires: Apple II Plus, IIe, IIc, or IIGS; 64K RAM; 5¼-inch disk drive; 24-line-by-40-character monitor. Individual unit includes one backup drive. DOS 3.3, copy-protected, does not work with mouse.

National Survival Institute
1608 825-8 Avenue SW
Calgary, Alberta T2P 2T4
Canada
(613) 220-3651

CIRCLE READER SERVICE NO. **508**



Infocom's The Lurking Horror interactive-fiction horror story

THE LURKING HORROR

The Lurking Horror is Infocom's first interactive-fiction horror story. As the main character in the game, the player is enrolled in the George Underwood Edwards Institute of Technology and during a storm is drawn into the dark, nether regions of the institute by a strange force. The institute reputedly has basements and storage rooms containing rotting piles of unidentifiable junk and decrepit underground tunnels that are crumbling into hazardous piles of concrete.

List Price: $39.95

Requires: Apple II Plus, IIe, IIc, or IIGS; 48K RAM; one 5¼-inch disk drive. Not copy-protected; mouse optional.

Infocom, Inc.
125 Cambridge Park Drive
Cambridge, MA 02140
(617) 492-6000

CIRCLE READER SERVICE NO. **509**

W.O.R.K. AT HOME

W.O.R.K. At Home, which stands for write, organize, report, and "kalculate," is the first package in Britannica Software's new Design-Ware *Plus* line of software

designed to provide home-computer users with easy-to-use tools for home projects, such as preparing school reports, keeping track of expenses, or maintaining address books. The package includes a tutorial disk that steps first-time users through the various commands and keystrokes needed to use its integrated word-processing, database, and spreadsheet programs. In addition, the software contains help screens, pull-down menus, prompt lines, and an Undo function. Also included are two booklets—a users' guide and the *W.O.R.K.Book*—which contain illustrations and application examples.
List Price: $59.95
Requires: Apple IIe, IIc, or IIGS; 128K RAM; one 5¼-inch disk drive. DOS 3.3; copy-protected; does not work with mouse.
Britannica Software
185 Berry Street
San Francisco, CA 94107
(415) 546-1866
CIRCLE READER SERVICE NO. **510**

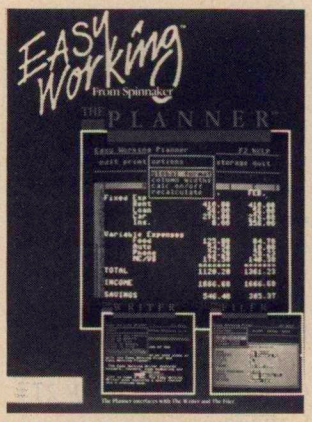
EASY WORKING SOFTWARE

Easy Working Software, a division of Spinnaker Software Corporation, has released three integratable productivity programs—The Writer, The Planner, and The Filer.

Designed for first-time word-processor users, The Writer provides standard word-processing functions, such as cut and paste, automatic page numbering, search and replace, and underlining. It also has a spelling-check feature that recognizes more than 99% of spelling and typing errors.

The Filer acts as a database for storing and organizing records, letting users store more than 50,000 records per file. Designed for such applications as creating and sorting mailing lists, club-membership files, and inventories, The Filer also integrates with The Writer to let users create form letters.

The electronic spreadsheet The Planner features extensive math calculations, standard editing functions such as insertion and deletion of information and movement of cells, and on-screen help. Applications include home budgeting, tax calculations, preparation of financial statements, and more.
List Price: $9.95 each
Requires: Apple IIe, IIc, or IIGS; 128K RAM; 5¼-inch disk drive. ProDOS; not copy-protected; does not work with mouse.
Spinnaker Software Corporation
One Kendall Square
Cambridge, MA 02139
(617) 494-1200
CIRCLE READER SERVICE NO. **511**



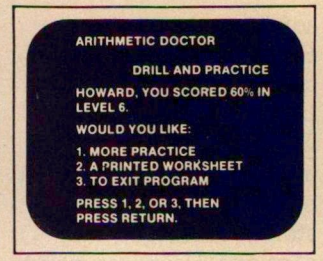
Three integratable productivity programs from Easy Working Software

ARITHMETIC DOCTOR

Arithmetic Doctor provides students with individualized tests and drills and offers continuous reinforcement through worksheets. The software is available either as individual titles—Whole Numbers, Decimals, and Fractions—or as a complete set.

Each individual program comes on four disks, each of which is independent and contains one of four operations. Each operation is further subdivided into 17–19 specific, progressive levels of randomly generated difficulty. Instructors can tailor the type, level, and number of examples on worksheets and computer lessons to their requirements and can print out worksheets and answer keys.

Arithmetic Doctor's management system scores students' work and keeps track of their progress, automatically advancing them to the next level or prescribing reinforcement work as necessary.
List Price: $129 each; complete set, $349
Requires: Apple II Plus, IIe, IIc, or IIGS; 48K RAM; one 5¼-inch disk drive. DOS 3.3; copy-protected (comes with backup); does not work with mouse. Each title includes four diskettes, four backups, management, and documentation.
Educational Activities, Inc.
P.O. Box 392
Freeport, NY 11520
(516) 223-4666
(800) 645-3739
CIRCLE READER SERVICE NO. **512**



Screen from Arithmetic Doctor

COMPUSEC PORTFOLIO MANAGER

Compunetics, Inc. claims that its portfolio manager Compusec has features that surpass those of much more expensive software. This $79.50 package comes with a detailed 120-page manual and provides both program and portfolio management on one disk. Compusec is divided into modules, collectively producing reports that you can either view on the screen or print out. The Holdings module shows number of shares currently held, price paid, current worth, and unrealized gain or loss. A Capital Gains & Losses report shows realized gains and losses for the year to date. A unique feature of Compusec is the payback report, which calculates rate of earnings per share and then determines how long it will take that stock to "pay back" its market price.
List Price: $79.50
Requires: Apple II Plus, IIe, or IIc; 48K RAM; one 5¼-inch disk drive. DOS 3.3; not copy-protected; does not work with mouse.
Compunetics, Inc.
6601 River Road
Bethesda, MD 20817-4929
(301) 320-5820
CIRCLE READER SERVICE NO. **513**

PIPELINE

BRIDGE 5.0

Artworx Software Company has released Bridge 5.0, an enhanced version of its bridge-playing program. Bridge 5.0 features improved bidding based on the five-card-major approach and uses both Blackwood and Stayman conventions. The program can store hands on-disk for replay at a later date and lets users choose the number of high-card points to be dealt. Also available is an auto-play mode that allows the computer to bid or play for users.

List Price: $29.95
Requires: Apple II Plus, IIe, IIc, or IIGS; 48K RAM; one 5¼-inch disk drive. DOS 3.3; copy-protected; does not work with mouse.

Artworx Software Company, Inc.
1844 Penfield Road
Penfield, NY 14526
(800) 828-6573
(716) 385-6120

CIRCLE READER SERVICE NO. **514**

MANAGING YOUR MONEY

An expanded version of the personal financial software package Managing Your Money is now available. Designed for professional, small-business, and home use, Version 2.0 features seven integrated programs for such tasks as checkbook management, tax planning, insurance and retirement planning, and portfolio management. New features include accounts payable and receivable with aging, five-year budgeting, tax forecasting, buy vs. lease comparisons, mortgage refinancing, invoice printing, and a card file that generates mailing lists and prints mailing labels. *(List Price: $199.95)*
Requires: Apple IIe, IIc, or IIGS; 128K RAM; two disk drives (shipped with 5¼-inch diskettes; 3.5-inch format available for $15 extra). ProDOS; not copy-protected; does not work with mouse.

MECA
285 Riverside Avenue
Westport, CT 06880
(203) 222-1000

CIRCLE READER SERVICE NO. **515**

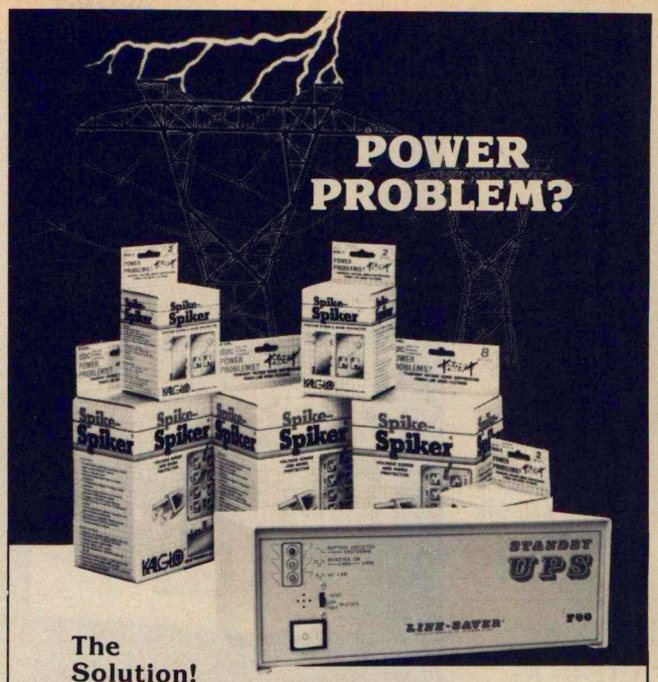
GO FORTH

Go Forth is a ProDOS-compatible version of FIG-1979 Forth that can also be extended to the FIG-1983 standard. Go Forth works under ProDOS, uses ProDOS files, and can make all ProDOS system calls directly. Because programs you write are compiled to machine language, they work quickly.

Go Forth comes with an assortment of extensions to standard Forth. It also includes a system editor for program development and an assembler for language extensions. Available as an option is the tutorial manual *Starting Forth* by Leon Brodie.
List Price: $49.95; *Starting Forth*, $18.95
Requires: Apple IIe, IIc, IIGS, or III; one 5¼- or 3.5-inch disk drive (depending on disk size you purchase). ProDOS or SOS (for Apple III); not copy-protected; mouse optional.

Pair Software
3201 Murchison Way
Carmichael, CA 95608
(916) 485-6525

CIRCLE READER SERVICE NO. **516**



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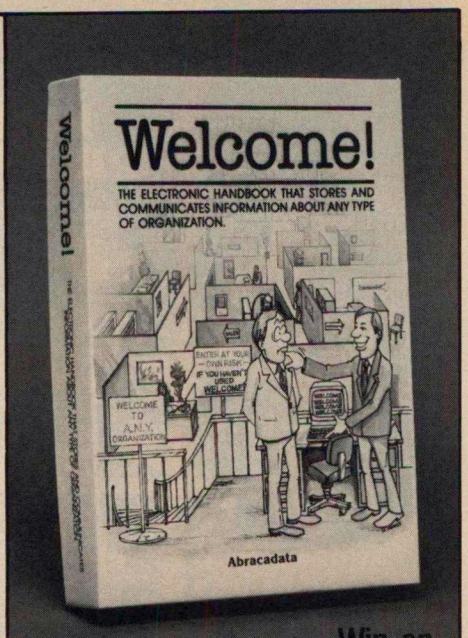
It's a handbook on disk that helps you communicate in graphics and text all about your organization.



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903	Appleworks Tips & Techniques #3:..Hardware	19.99
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1201	Data.Paste - merges any AppleWorks data bases.	39.00

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CIRCLE 199 ON READER SERVICE CARD

PIPELINE

MISCELLANEOUS

DATABORD COMPUTER FURNITURE

Ergonomically designed to reduce eyestrain, back problems, and uncomfortable reaching, Krueger's DataBord 920 system of computer furniture lets users adjust the height of the screen and keyboard surface separately. The modular system is flexible and expandable and so can adjust to changing requirements and lets users integrate a full range of accessories and peripherals to create a unified workstation. All wiring is concealed for safety and aesthetic appeal. A free, 18-page, full-color brochure describes many options in work surfaces, machine tables, and printer stands in various styles.

Krueger, Inc.
P.O. Box 8100
Green Bay, WI
54038-8100
(414) 468-8100

CIRCLE READER SERVICE NO. **517**

CLIPBOARD CADDY

Chenesko Products has reduced the price of its Clipboard Caddy and introduced a new rounded design. Constructed of solid-oak hardwood, the caddy holds almost any clipboard in a vertical position so that users can display copy for easy reference, editing, and viewing. As well as holding copy, the caddy functions as a desk organizer for holding items such as rulers, pens, business cards, notes, and memos. Optional clear acrylic dividers are also available to enable the caddy to hold larger items such as file folders and letters. The caddy comes in models with walnut stain and with and without satin finish and with and without a clear acrylic clipboard.

List Price: Clipboard Caddy, $19.95 finished, $17.95 unfinished; dividers, $7.95 each

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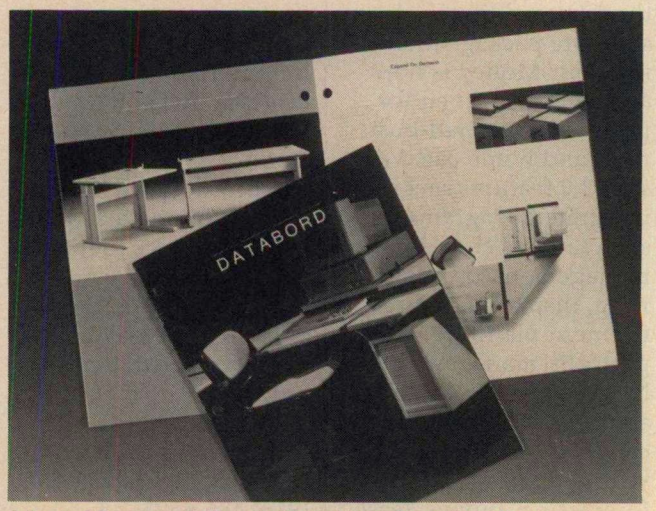

A free, 18-page, full-color brochure describes Krueger's DataBord computer furniture.

Rescue Squad

BY GARY B. LITTLE

INEXPENSIVE GRAPHS

Q. *I'm trying to find an inexpensive program that can produce line and bar graphs from data I enter from the keyboard. I need the ability to plot more than one set of data on the same graph. Is anything like this available?*

Samuel J. Neiditch
Redlands, CA

A. I believe I have just the program for you: Curve Plotter from Spectral Graphics Software (#2560 - 6333 Pacific Avenue, Stockton, CA 95207; [209] 473-2862). This $29.95 program can plot up to three curves per graph and handles up to 100 points per curve. Spectral Graphics also sells AlphaChart for generating bar and pie graphs and 3DChart for three-dimensional graphs.

If you have some programming experience, you will find Roger Wagner Publishing's Chart 'N Graph Toolbox handy as well. It adds a useful set of graph-related commands to Applesoft so that you can easily generate a wide variety of graphs and charts in your own programs. Contact RWP at 1050 Pioneer Way, Suite P, El Cajon, CA 92020; (619) 442-0522. RWP also sells a Trial-Size Toolbox containing several fully functional commands from the Chart 'N Graph Toolbox. If you mention to RWP that you read about the Trial-Size Toolbox in *A+*, you will get it for no charge.

IIc SCREEN DUMPS

Q. *I own an Apple IIc and an ImageWriter II printer. I am having trouble printing graphs and pictures I have created with an Applesoft program. Is there a command that will let me print them?*

David J. Hopkins
Ridgewood, NY

A. The IIc has no built-in screen-dump commands, so you'll have to rely on a separate program to do the printing for you. Three of the best are The Printographer (Roger Wagner Publishing, 1050 Pioneer Way, Suite P, El Cajon, CA 92020; [619] 442-0522); Triple-Dump (Beagle Bros., 3990 Old Town Avenue, Suite 102C, San Diego, CA 92110; [619] 296-6400); and The Graphics Manager (On Three, 4478 Market Street, Suites 701–702, Ventura, CA 93003; [805] 644-3514). All can handle low-res, hi-res, and double-high-res pictures.

IIe SELF-TEST

Q. *I've heard the IIe has a self-test feature that checks whether the system is working properly. How do I use it?*

Lee Soo Khoon
Singapore

A. To invoke the self-test subroutine on the IIe, type Control-Reset while holding down the closed-apple key.

The subroutine begins by displaying a random pattern on the low-resolution graphics screen; as the test proceeds, the pattern changes to let you know something is going on. The test takes about 30 seconds and ends with a System OK message if all goes well.

Possible error messages are MMU (memory-management-unit error), IOU (input/output-unit error), RAM ZP (zero-page memory error), and RAM (non-zero-page memory error). The memory-error messages are followed by an eight-digit binary number; any bits that are 1 in this number represent the failing bits.

You can restart the self-test subroutine after seeing the System OK message by holding down both apple keys simultaneously. To exit, you must reboot the system with a Control/open-apple/Reset.

Note that a IIc with 32K ROMs (the so-called 3.5 ROMs that work with the UniDisk 3.5) has almost the same self-test subroutine as the Apple IIe.

The self-test for the IIGS is quite different, however, and ends with a System Good if all goes well. To start the self-test on the IIGS, press Control-Reset while holding down the Option (closed-apple) and open-apple keys. +

ILLUSTRATION BY PETER BONO

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Reliability - MTBF	20,000 Hours	Reliability - MTBF	20,000 Hours
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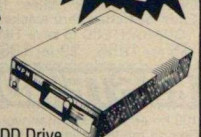

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EDUCATIONAL Category
begins on next page

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```
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BEGIN
··IF want_free_newsletter THEN BEGIN
.... WRITELN('Palos Computer Concepts');
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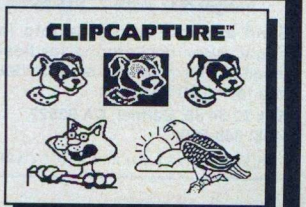

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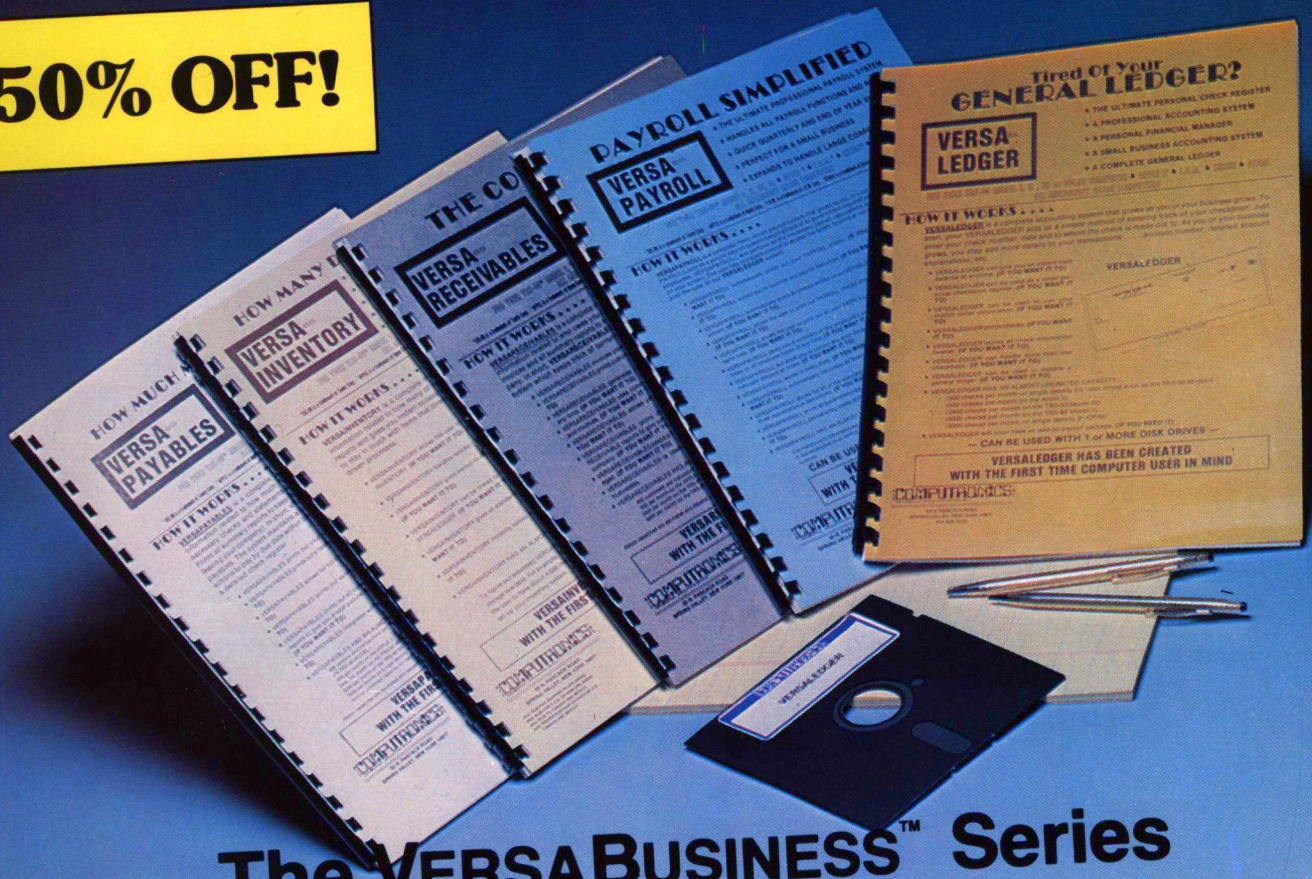

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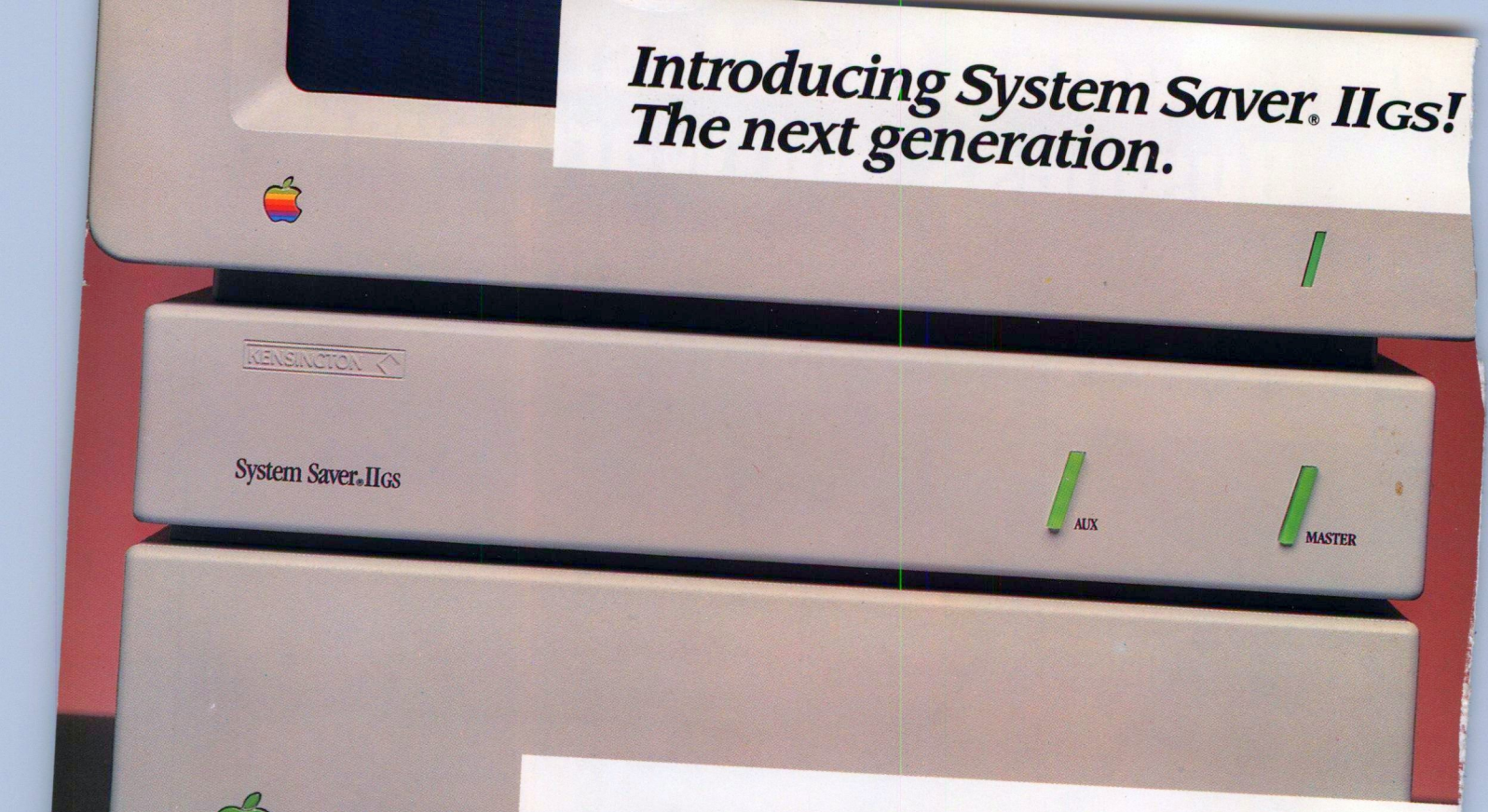

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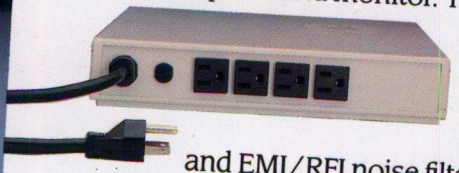

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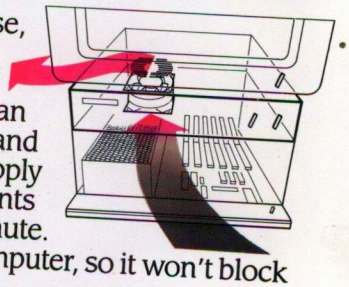

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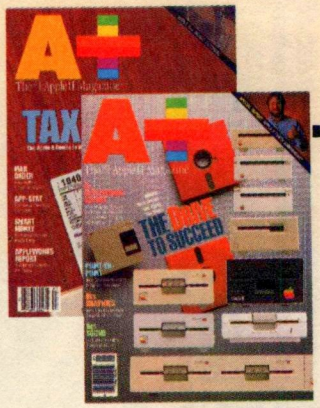

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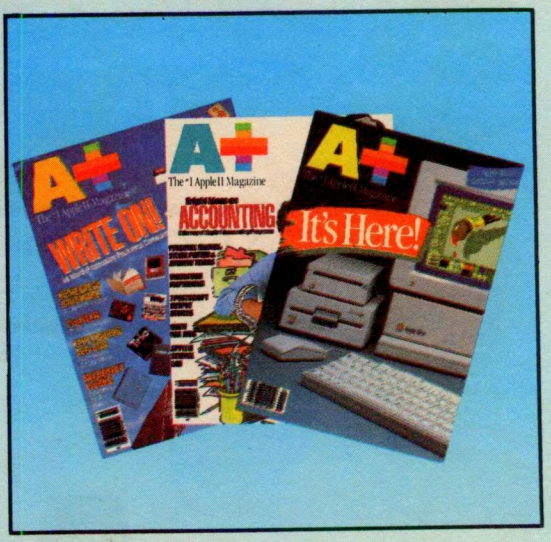

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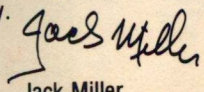

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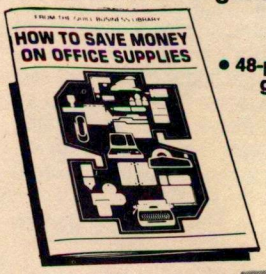

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